

APPENDIX G – SPECIFICATIONS, REVISED 12/26/15

BIDDER INSTRUCTIONS:

Bidders will provide the following information as instructed below. Bidder is not required to bid every category. Bidders must indicate their choice by indicating, NO BID, as shown in the sample below for categories Bidder chooses not to submit a bid. Failure to provide information as instructed may result in rejection and will not be further evaluated. The state reserves the right to seek clarification, if needed, and Bidder will designate a single point of contact to be available during the Evaluation Phase for this specific purpose. All clarifications will be requested via email to the contact email provided by the Bidder below. When seeking clarification, the state will make a single attempt to contact the designated person. It is the Bidder’s responsibility to ensure the validity of the email address. Response to clarifying email is expected within 2 hours of receipt of email.

- 1)In each Category, identify the Manufacturer in the space provided.
- 2)Identify the Product Model Name/ Number in the space provided.
- 3)Indicate how Bidder meets or exceeds each mandatory requirement in the space provided.

Sample:

Manufacturer:	NO BID
Product Model Name/Number:	

Single Point of Contact for clarifying question during evaluation: Diane Foley

Contact email address: dfoley@gtspower.com

1. BATTERIES, MODULAR FLOODED LEAD ACID

Category Definition: Low-maintenance, long-life lead acid battery cells and assemblies, along with all associated installation and maintenance hardware, supplies, and tools.

Example Product: Quantity one (1) — 48 volt / 1000 Amp-Hour battery assembly in floor-mount rack

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	ASSEMBLY of 24 flooded cells to produce ~48 volt, Includes buss bars to connection batteries	
1.1.	Capacity: > 1000 Amp/Hours @ 25°C	
1.2.	Design life expectancy: 20 years @ 25°C / 1200 cycles at 80% DOD	
1.3.	Floor-mount frame/rack, seismic rated (Vendor Supplied)	
1.4.	Protective covers to prevent accidental contact with battery terminals.	

2.	GENERAL FEATURES	
2.1.	Low Maintenance design, 1-3 year watering	
2.2.	Leak-proof post seals	
2.3.	Easy to fill caps, with flame arrestor vent	
2.4.	ISO 9001 Quality Management within manufacturing process	
2.5.	ISO 14001 Environmental Management within manufacturing process	
3.	WARRANTY - 100% coverage during the first 3 years, with proration thereafter for the design life.	
4.	DOCUMENTATION -Vendor shall maintain on their website current versions of all instructions, specifications, MSDS, and certifications.	
5.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

2. BATTERIES, MODULAR VALVE REGULATED LEAD ACID

Category Definition: Low-maintenance, long life, Absorbed Glass Mat (AGM) battery cells and assemblies, along with all associated installation and maintenance hardware and tools.

Example Product: Quantity one (1) — 48 volt / 1000 Amp-Hour battery assembly in floor-mount rack

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	ASSEMBLY of 24 VRLA cells to produce ~48 volt, Includes buss bars to connection batteries	
1.1.	Capacity: > 1000 Amp/Hours @ 25°C	
1.2.	Design life expectancy: 20 years @ 25°C / 1200 cycles at 80% DOD	
1.3.	Floor-mount frame/rack, seismic rated (Vendor Supplied)	
1.4.	Framework disassembles for transport into individual cases	
1.5.	Protective covers to prevent accidental contact with	

	battery terminals.	
2.	GENERAL FEATURES	
2.1.	Maintenance-free design, no filling	
2.2.	One-way, self-resealing safety vents, with high opening pressure to minimize battery gassing.	
2.3.	ISO 9001 Quality Management within manufacturing process	
2.4.	ISO 14001 Environmental Management within manufacturing process	
3.	WARRANTY: 100% coverage during the first 3 years, with proration thereafter for the design life.	
4.	DOCUMENTATION: Vendor shall maintain on their website current versions of all instructions, specifications, MSDS, and certifications.	
5.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

3. BATTERIES, MONO-BLOCK VALVE REGULATED LEAD ACID

Category Definition: Low-maintenance Absorbed Glass Mat (AGM) and Gel battery blocks of various voltage and capacity configurations, along with all associated installation and maintenance hardware and tools.

Example Product: Quantity one (1) — 48 volt / 100 Amp-Hour battery assembly to mount in 19” equipment

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	ASSEMBLY of four (4) batteries to produce ~ 48 volt, Includes buss bars to connection batteries	
1.1.	Capacity: > 100 Amp/Hours @ 25°C	
1.2.	Design life expectancy: minimum 10 years @ 25°C	
1.3.	Width: < 4.4 inch per battery, 17.6 inch total (Customer supplied 19” equipment rack shelf)	
1.4.	Front accessible battery terminals, with safety covers	
2.	GENERAL FEATURES	
2.1.	Maintenance-free design, no filling	

2.2.	One-way, self-resealing safety vents, with high opening pressure to minimize battery gassing.	
2.3.	Heavy-duty carrying handles	
2.4.	ISO 9001 Quality Management within manufacturing process	
2.5.	ISO 14001 Environmental Management within manufacturing process	
3.	WARRANTY: 100% coverage during the first 3 years, with proration thereafter for the design life.	
4.	DOCUMENTATION: Vendor shall maintain on their website current versions of all instructions, specifications, MSDS, and certifications.	
5.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

4. BATTERIES, PORTABLE RADIO

Category Definition: high-capacity rechargeable batteries for public safety grade radios, along with single and multi-unit chargers, and all associated accessories and supplies.

Example Product: Quantity 200 — 3000 mAh, 7.4 volt battery for Motorola APX6000 and/or APX7000 portable radio.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	GLOBAL TECHNOLOGY SYSTEMS, INC.
Product Model Name/Number:	H7038-LiP

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

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Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	FUNCTIONAL REQUIREMENTS	
1.1.	Battery shall be 7.4V @ 3000mAh, Lithium Ion or Lithium Ion Polymer, with case and contacts to fit Motorola APX6000 or APX7000 portable radio.	7.4V; Lithium Ion Polymer battery pack suitable for use with APX6000 or 7000 portable radio. Refer to Descriptive Literature (1.1) H7038-LiP ~_Spec_sheet_12.08.10 located in Folder #6 .
1.2.	Battery shall operate to a wide temperature range (-10°C to +60°C). Operation at cold temperature limit shall provide a minimum of 1 hour of performance.	GTS H7038-LiP NEOCELL battery will EXCEED the required specification for both the low temperature and the high temperature thresholds. Refer to Descriptive Literature (1.2) H7038-LiP Neocell Temperature Tests located in Folder #6 for supplemental information.
2.	BATTERY CONSTRUCTION Vendor shall supply detailed evidence sufficient to verify	Detailed battery construction including specifications and photos are located in Folder #6. Refer to item (1A) H7038LiP Construction Detail (FINAL)

	compliance with the following requirements. Evidence shall include photographs of battery dissection and/or assembly process, and may include construction/assembly drawings as needed to fully evidence quality.	
2.1.	Batteries shall be constructed with polycarbonate plastic and ultrasonically sealed. – Verification per above	Polycarbonate plastic – Refer to Descriptive Literature labeled (2.1) FPR3500-UL-Card1 located in Folder #6 Ultrasonic Seal – Refer to Descriptive Literature (2.1) H7038-LiP-Ultrasonic Weld SOP(English) located in Folder #6 FOLDER #6 (1A) H7038-LiP Construction Detail (Ultrasonic weld seal)
2.2.	Battery shall be constructed with flexible or printed circuit board with copper circuitry to make electrical connections between components and cells and tolerate higher levels of impact force. Wire interconnects will not be accepted. – Verification per above	Refer to Descriptive Literature found in FOLDER #6 (1A) H7038-LiP Construction Detail. (See Flex PCM, P4 Photo 2&3, P6 photo2)
2.3.	Batteries shall be constructed with shock-absorbing materials to protect the cell pack, circuitry, dampen shock and vibration inside the battery and reduce negative effects of sudden impact. – Verification per above	Refer to Descriptive Literature found in FOLDER #6 (1A) H7038-LiP Construction Detail. (See Pack Insulation, Pack Ruggedness, Performance Testing Characteristics of Design, Drop Testing)
2.4.	Batteries shall be constructed to fit securely to the radio and to release easily. Latches shall attach to radio with audible latching sound and shall be robust sufficient to endure wear and tear from normal usage over 4 year warranty period. – Verification per above	Refer to Descriptive Literature found in FOLDER #6 (1A) H7038-LiP Construction Detail. Samples available upon request.
2.5.	Battery pack label shall show a unique serial number with imbedded date code for determining warranty status and tracking inventory. – Vendor shall provide information for identifying date codes.	Refer to Descriptive Literature (2.5) Serial Number Date Code Instructions in Folder #6 for supplemental information.
3.	TESTING & CERTIFICATION:	

3.1.	Battery cells shall be certified to IEC62133 (or) UL1642 for cell safety. <ul style="list-style-type: none"> – Vendor shall provide documentation from an accredited testing laboratory. 	Refer to Descriptive Literature 3.1 – UL1642 Certificate of Compliance found in Folder #6
3.2.	Battery pack shall be certified to UL2054 for safety. <ul style="list-style-type: none"> – Vendor shall provide documentation from an accredited testing laboratory. 	Refer to Descriptive Literature – (3.2) UL2054 Certificate of Compliance & (3.2) UL2054 Listing Report found in Folder #6
3.3.	Batteries shall pass stringent electrostatic discharge test that meets Electro-Technical Commission (IE C6100-4-2). Batteries shall be tested for electrostatic discharge tests for both contact discharge (10 discharges each at three different voltages, up to 8kV of both positive and negative polarity) on each battery contact and for air discharge (10 discharges each at five different voltages, up to 15kV of both positive and negative polarity) per the standard. <ul style="list-style-type: none"> – Vendor shall provide documentation from an accredited testing laboratory. 	Refer to Descriptive Literature 3.3 – IE C6100-4-2 found in Folder #6
3.4.	Plastic housing shall meet UL94V0 specification for flammability related to Lithium battery pack plastics. <ul style="list-style-type: none"> – Vendor shall provide documentation from an accredited testing laboratory. 	GTS NEOCELL battery packs are constructed with Mitsubishi FPR3500 plastics Refer to Descriptive Literature (2.1) FPR3500-UL-CARD1 & documentation labeled (3.4) FPR3500 which highlights in the BLUE column the specification for these plastics. Found in Folder #6 .
3.5.	Batteries shall meet DOT Certification UN38.3 for transport of Lithium batteries including test results for altitude, vibration, shock, external short circuit, crush, overcharge and forced discharge. <ul style="list-style-type: none"> – Vendor shall provide documentation from an accredited testing laboratory. 	Refer to Descriptive Literature (3.5-1, 3.5-2, 3.5-3, 3.5-4)
4.	WARRANTY:	
4.1.	Batteries shall be warranted for 48 months against any defects in manufacturing or workmanship, with no proration.	See Descriptive Literature (4.1) GTS Warranty found in Folder #6 .

4.2. 4.3.	Batteries shall be warranted to maintain a minimum of 80% of rated capacity for 18 months from date of shipment, under normal condition, with no proration.	GTS H7038-LiP EXCEEDS this warranty by offering a 24 month warranty to maintain 80% capacity from date of shipment, no proration. Refer to Descriptive Literature (4.1) GTS Warranty found in Folder #6 .
4.4.	Vendor shall describe RMA policy.	Refer to Descriptive Literature (4.4) RMA Policy found in Folder #6
5.	DELIVERY: Vendor shall guarantee delivery within 30 days ARO on all orders of less than 1000 batteries.	Agreed. GTS has a long history of supporting very large customers (both public safety and enterprise) with large quantity orders. See Bidders Sections 5. Bidders Qualifications for supporting history and experience.
6.	DOCUMENTATION: Vendor shall maintain on their website current versions of all instructions, specifications, MSDS, and certifications.	Agreed. GTS does not currently list these items of the website, www.gtspower.com . However, we have a full Marketing Team who can have this information posted prior to award of any contract. GTS does commit to maintaining our website per NASPO requirements listed here.
7.	RECYCLING: Vendor shall provide free recycling service according to all federal, state and local regulations.	GTS facilitates a relationship between RBRC and all of our customers. This allows for seamless recycling at no cost to the customer. GTS guarantees that if any problems are encountered with this system, we will step in to directly manage a similar recycling program. Refer to Descriptive Literature (7) Battery Recycling Program found in Folder #6
8.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	Agreed. No shipping will be charged to customers using the NASPO contract.

5. EQUIPMENT SHELTERS, BALLASTED

Category Definition: Equipment shelters of various sizes specifically designed and constructed for extreme installation locations and to be installed with minimal soil disruption and without site-build foundation; along with necessary accessories and appurtenances, including antenna mast, RF shielding, and grounding systems.

Example Product: Quantity one (1) — 40 ft.² equipment shelter equipped for helicopter transport.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SHELTER AREA: ~40 ft. ² (±10%)	
2.	SHELTER HEIGHT: >7 ft	
3.	TEMPERATURE RANGE: -50°F to +150°F	
4.	RATED WIND VELOCITY: (2” radial ice): >150 mph	
5.	DESIGN AND CONSTRUCTION	
5.1	Shelter shall be impact resistant to flying debris at the rated wind velocity.	
5.2	Shelter shall be installed without conventional foundation	

	and with only minimal ground disruption – for installation in sensitive locations.	
5.3	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.	
5.4	Floor Load: >180 lbs-ft. ²	
5.5	Roof Load: >100 lbs-ft. ²	
5.6	Roof Impact Resistance: >100 lbs-ft. ² with no damage to exterior or interior of the roof or shelter.	
5.7	Roof and wall exteriors shall be constructed to provide full weather resistance and resistance to flying embers from adjacent fire; asphalt roofing and other combustible materials shall not be used.	
5.8	Screened Ventilation shall adequately provide to permit occupancy by persons in the event adverse weather prohibits travel.	
5.9	Cable entry panel: two each, 4-inch ports	
5.10	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.	
6.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.	
7.	Warranty: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
8.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

6. EQUIPMENT SHELTERS, CONCRETE

Category Definition: Equipment shelters of various sizes constructed of precast concrete, specifically designed and constructed for extreme installation locations.

Example Product = Quantity one (1) — 40 ft.² equipment shelter

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Shelter area: ~40 ft. ² (±10%)	
2.	Shelter height: >7 ft	
3.	Temperature range: -50°F to +150°F	
4.	Rated Wind Velocity: (2” radial ice): >150 mph	
5.	DESIGN AND CONSTRUCTION	
5.1	Shelter shall be impact resistant to flying debris at the rated wind velocity and bullet resistant (30:06 @ point-blank range)	
5.2	Floor Load: >200 lbs-ft. ²	

5.3	Roof Load: >100 lbs-ft. ²	
5.4	Roof Impact Resistance: >200 lbs-ft. ² with no damage to exterior or interior of the roof or shelter.	
5.5	Adequate Screened Ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.	
5.6	The structure shall be of precast steel reinforced concrete (5000 psi) panels with welded connections.	
5.7	All exterior metallic components and fasteners shall be stainless steel or hot-dipped galvanized.	
5.8	Roof shall be coated/sealed with an elastomeric coating.	
5.9	All joints shall be sealed inside and outside with an elastomeric caulking.	
5.10	Flooring: commercial grade floor tile	
5.11	Doors: galvanized steel primed & painted, 16-gauge door with 14-gauge frame.	
5.12	Cable entry panel: six each, 4-inch ports	
5.13	Shelter shall provide for Lightning Protection and grounding features that meet or exceed current industry applicable standards	
5.14	Vendor shall supply Foundation Design based on customer supplied soils report.	
5.15	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.	
6.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.	
7.	Warranty: Three (3) Years	

	(Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
8.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

7. EQUIPMENT SHELTERS, FIBERGLASS

Category Definition: Equipment shelters of molded fiberglass construction, specifically designed and constructed for extreme installation locations.

Example Product: Quantity one (1) — 40 ft.² equipment shelter equipped for helicopter transport.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Shelter area: ~40 ft. ² (±10%)	
2.	Shelter height: >7 ft	S
3.	Temperature range: -50°F to +150°F	
4.	Rated wind velocity: (2" radial ice): >150 mph	
5.	DESIGN AND CONSTRUCTION	
5.1	Shelter design and construction shall be impact resistant to flying debris at the rated wind velocity	
5.2	Adequate screened ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.	

5.3	The primary structure shall be a one-piece Fiber Reinforce Plastic (FRP) structural laminate with foam insulating core.	
5.4	All metallic components shall be stainless steel.	
5.5	All doors and access panels will be locked	
5.6	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards	
5.7	Vendor shall supply foundation design based on customer supplied soils report.	
6.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a complete shelter.	
7.	Warranty: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
8.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

8. EQUIPMENT SHELTERS, FRAMED LIGHT-WEIGHT

Category Definition: Equipment shelters of framed construction; with metal, cement board, or other composite exterior; specifically designed and constructed for extreme installation locations.

Example Product: Quantity one (1) — 40 ft.² equipment shelter

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Shelter area: ~40 ft. ² (±10%)	
2.	Shelter height: >7 ft	
3.	Temperature range: -50°F to +150°F	
4.	Rated Wind Velocity (2” radial ice): >100 mph	
5.	DESIGN AND CONSTRUCTION	
5.1	Shelter design and construction shall be impact resistant to flying debris at the rated wind velocity.	
5.2	Floor Load: >180 lbs-ft. ²	

5.3	Roof Load: > 80 lbs-ft. ²	
5.4	Roof Impact Resistance: 100 lbs-ft. ² with no damage to exterior or interior of the roof or shelter.	
5.5	Adequate screened ventilation shall be provided to permit occupancy by persons in the event adverse weather prohibits travel.	
5.6	Insulation shall be installed between interior and exterior wall providing a value of >R13.	
5.7	All exterior metallic components and fasteners shall be stainless steel or hot-dipped galvanized.	
5.8	Roof and wall exteriors shall be constructed to provide full weather resistance and resistance to flying embers from adjacent fire; asphalt roofing and other combustible materials shall not be used.	
5.9	All joints/seams shall be sealed and fully weather-tight.	
5.10	Flooring: commercial grade floor tile	
5.11	Doors: galvanized steel primed & painted, 16-gauge door with 14-gauge frame.	
5.12	Cable entry panel: six each, 4-inch ports or equivalent grounded multiport entry panel	
5.13	Shelter shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.	
5.14	Vendor shall supply foundation design based on customer supplied soils report.	
5.15	Vendor shall note that compliance with state specific requirements for Factory Assembled Structures will be addressed in individual state Participating Agreements.	
6.	Vendor may offer integration of components from other manufacturers (HVAC, generators, UPS, equipment racks, cable trays, etc.) as an additional service so as to deliver a	

	complete shelter.	
7.	Warranty: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
8.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations Non-contiguous U.S., F.O.B. Port	

9. EQUIPMENT SHELTERS, OUTDOOR CABINET

Category Definition: Equipment cabinets of single and multiple widths of EIA standard 19” and 23” rack, in various depths and heights; , specifically designed and constructed for extreme installation locations; providing protection conforming to NEMA-3R, UL50, and UL50E standards, along with associated components and hardware.

Example Product: Quantity one (1) — Single width, 19” - 84 RU cabinet of 25 inch depth.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	CABINET DIMENSIONS	
1.1.	Width: EIA standard 19” rack, single width, ~25 inches	
1.2.	Height: 42 Rack Units (RU), ~ 78 inches	
1.3.	Depth: ~25 inches	
2.	CONSTRUCTION – resistant to impact and corrosion	
2.1.	Exterior: high strength aluminum	

2.2.	Hardware: stainless steel	
2.3.	Weather-tight: NEMA 3R standard	
3.	RACK RAILS: 2 pair, individually depth adjustable	
3.1.	Two pair,	
3.2.	Fully drilled and tapped	
4.	THERMAL PROTECTION	
4.1.	Solar shield roof with air gap to dissipate radiant heat.	
4.2.	Solar shield vent and perimeter screened to prevent insect entry.	
4.3.	Insulation bonded to interior walls.	
4.4.	Exhaust fans: 12 VDC, with thermostat.	
4.5.	Cabinet shall provide for lightning protection and grounding features that meet or exceed current industry applicable standards.	
5.	DOORS	
5.1.	Two (2) doors, front and back	
5.2.	Continuous hinge	
5.3.	Three point locking mechanism	
5.4.	Internal lock or external padlock	
6.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
7.	SHIPPING: F.O. B. All Destinations	

10. FURNITURE, DISPATCH CONSOLE

Category Definition: Specialized dispatch center workstations, CPU enclosures, and auxiliary furniture such as storage units, printer cabinets, files, and tables.

Example Product: Quantity one (1) — 911-Center Dispatch Workstation with partitioned screens.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	WORKSTATION DESCRIPTION	
1.1.	Workstation is one position of a 10-position dispatch center.	
1.2.	Workstation display area supports five – 23 inch flat-panel monitors on a single level.	
1.3.	Workstation enclosure supports three standard CPU units.	
1.4.	– Workstation input area supports two full-size keyboards and three pointing devices (mouse or trackball)	
2.	REQUIREMENT SUMMARY	

2.1.	The workstation is designed specifically for 24/7 operations in an Emergency Communications Center environment. – Usage is 5-times normal office environment. Office furniture systems will not be considered.	
2.2.	The workstation shall meet ANSI/HFES 100-2007, ANSI/BIFMA X5.5-1998(Desk Products).	
2.3.	The workstation shall meet all ADA guidelines and requirements.	
2.4.	The lifecycle of the workstation shall be no less than 10 years, encompassing over 80,000 hours of use.	
3.	STABILITY - FUNCTIONALITY	
3.1.	Console furniture is modular in design for ease of reconfiguration and upgrading. Technology and personal storage units should have the ability to be field removed or replaced without deconstruction of the console unit.	
3.2.	Sit-to-stand legs are bolted into the console undercarriage with a footprint designed to allow maximum stability based on the overall size of the Input Support Surface. Free standing leg and feet systems will not be acceptable.	
3.3.	There are no obstructions for side-to-side movement by the user within the console footprint. Knee space must be a minimum of 70% of the consoles overall width.	
3.4.	Horizontal work surfaces are supported by a steel tubular sub-frame for maximum durability.	
3.5.	Must be strong and rigid and able to meet all required standards for furniture construction.	
4.	INPUT SUPPORT (KEYBORAD AND MOUSE) SURFACE	
4.1.	Must provide a level platform to provide (a) be wide enough design to accommodate and	
4.1.1.	At least 200 square inches of writing surface.	

4.1.2.	At least two (2) full-size keyboards with numerical keypad.	
4.1.3.	At least three (3) pointing devices (mouse, trackball, or touchpad).	
4.2.	Surface mounted, user-configurable, user-accessible voice and data connections must be available and accessible from the front of the console. (PSB, CAT-6, USB)	
4.3	Must lower to 22" from the floor to accommodate the 5th percentile seated female per ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 8.3.2.4.3	
4.4.	Must raise to 48" above the floor to accommodate the 95th percentile standing male per ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 8.3.2.4.3	
4.5.	Provide infinite adjustment throughout the entire range, a critical function to meet ergonomic standards and reduce repetitive strain injuries and carpal tunnel syndrome.	
4.6.	Must place input devices with primary and secondary work zones to meet ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 5.2.4.1	
4.7.	Must maintain elbow angles between 70 and 135 degrees to meet ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 5.2.1.1	
4.8.	Electronic work surface adjustment must be independent of the monitor support adjustment. Other adjustment methods will be deemed unacceptable.	
4.9.	Adjustment controls to be easily accessible, provide digital readout and have a smooth surface for easy cleaning and sanitizing.	
4.10.	Must adjust simultaneously with the monitor support in order to retain relative positioning between both surfaces when changing from sitting to standing. Allowing quick	

	shifting from sitting to standing work postures.	
4.11.	Entire surface and all environmental controls shall move with the input surface to maintain the work environment settings.	
4.12.	Static load capacity of 1200 lbs. and an equipment load capacity of 500 lbs to accommodate all types and quantities of input devices.	
4.13.	Must provide a safety sensor in order to detect obstacles and prevent damage or injury.	
4.14.	A minimum safety clearance of 1.25" shall be required between all moving surfaces. ANSI- HFES 100-2007 Human Factors Engineering of Computer Workstations 8.3.1.2	
4.15.	All cabling required to operate the consoles features must be completely concealed.	
4.16.	Input surface should have lifting columns integrated into the storage cavities with no exposed leg sets.	
4.17.	Mechanism must leave an unobstructed knee clearance in the seated operating position in accordance with ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 8.3.2.1	
4.18.	All electrical components must be UL listed and CSA certified.	
4.19.	Must utilize an integrated brake for stability and prevention of binding. Braking system must lock surface into place when the brake is released.	
4.20.	All moveable components of the console shall be designed and tested to at least 40,000 cycle full range adjustments.	
5.	MONITORING VIEWING SUPPORT	
5.1.	Provide adjustment of monitors so that the gaze angle to the center of the screen ranges between 15° and 20°	

	below horizontal eye level. ANSI-HFES 100-2007 Human Factors Engineering of Computer Workstations 5.2.4.3.	
5.2.	Must allow adjustment of the line-of-sight (viewing) distance between the eyes and front surface of the viewable display area within the range of 19" and 31" to meet ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 5.2.4.2.	
5.3.	Design accommodates use of up to five (5) 23" widescreen LCD flat panel monitors on a single tier, and up to (10) 23" widescreen LCD flat panel monitors in a stacked configuration, with independent angle adjustment.	
5.4.	Surface mounted, user-configurable, user-accessible power and video connections must be available and accessible from the front of the console. (VGA, HDMI, DVI)	
5.5.	Array should allow for concurrent focal depth movement of at least 4 monitors at once and a minimum of 12" of travel. Array depth adjustment must lock into fixed position after adjustment to prevent accidental movement.	
5.6.	Adjustment controls to be flush mounted into surface or underneath the work surface and have a smooth surface for easy cleaning and sanitizing.	
5.7.	All electrical components must be UL listed and CSA certified.	
5.8.	Must be independently adjustable in relation to the Input Support Surface.	
5.9.	All moveable components of the console shall be designed and tested to at least 40,000 cycle full range adjustments.	
6.	SUPPORT ADJUSTMENT	
6.1.	Adjustment speed shall not be less than 1.25" per second	

	and not greater than 1.5” per second.	
6.2.	Adjustment controls to be flush mounted into surface or beneath work surface and have a smooth surface for easy cleaning.	
6.3.	Lifting system must operate quietly. Max sound level of 50db.	
7.	EQUIPMENT ENCLOSURES	
7.1.	Enclosures must be accessible from both the front and the rear.	
7.2.	Enclosures must be external from the primary work surface for minimal user disruption.	
7.3.	Must be available in two heights for small format and tower CPU configurations.	
7.4.	Must be available in multiple widths to accommodate different CPU configurations.	
7.5.	Must be available in two depths.	
7.6.	Enclosures must be stackable to allow additional technology storage or personal storage with taking up additional floor space.	
7.7.	All equipment enclosures are must utilize an active cooling system to ensure technology performing at optimum temperature.	
7.8.	Cooling system must feature a thermostatically controlled cooling system, activating at 85 degrees Fahrenheit. This ensures proper cooling without the need to have the cooling fans run continuously.	
7.9.	Switchable enclosure illumination must be provided.	
7.10.	Must incorporate an integrated horizontal a horizontal cable management system with a minimum capacity of (80) CAT5 cables.	
8.	PARTITION SCREEN	

8.1.	Frame to be constructed of steel components for maximum strength and durability.	
8.2.	All steel components must be powder coated for durability. Enamel paint not acceptable.	
8.3.	External Screen components must be available in abrasion resistant fabric covering.	
8.4.	Internal Screen materials must have a NRC rating of at least .75 and SAA rating of .78 to help reduce ambient noise levels.	
8.5.	Screening system as a whole must be tested in an independent laboratory and have a acoustical NRC rating of .75 or greater.	
8.6.	Internal components must be consist of environmentally safe, with a minimum of 75% recycled materials	
8.7.	Screen/partition system must be within the console footprint to maximize floor space.	
8.8.	All fasteners must be completely concealed.	
8.9.	All components must be field replaceable.	
8.10.	Must be available in multiple heights for maximum sound reduction and maximum sight lines. For bidding purposes: vendor shall provide pricing for a	
8.11.	Must be available with a 12" glass upper section to help maintain sight lines.	
9.	MATERIALS	
9.1.	Wood Part	
9.1.1.	Wood parts are constructed of 45 lb. density 1-1/8" thick wood core material, pressure bonded with a high-pressure laminate surface on both sides.	
9.2.	Surfaces	
9.2.1.	All monitor and input surfaces are 45 lb. density, 3/4"	

	thick wood core material, pressure bonded with a high-pressure horizontal grade laminate top and sealing horizontal grade backing sheet of laminate on the underside to prevent deflection.	
9.3.	Edge Material	
9.3.1.	All storage units and pedestals must use a 1.5mm thick thermoplastic vinyl extrusion with self-healing properties for maximum durability.	
9.3.2.	All Input Support Surfaces must use a 3mm thick thermoplastic vinyl extrusion with self-healing properties for maximum durability. Must have a minimum of a 3mm radius on front edge. ANSI/HFES 100-2007 Human Factors Engineering of Computer Workstations 8.3.1.4	
9.4.	Laminates	
9.4.1	High pressure laminate meets ANSI/ASME A 17.1; 1986 requirements for Class “B” laminate and ASTM D523-89, providing a non-glare matte finish.	
9.4.2.	All monitor and input surfaces are .0625” thickness horizontal grade laminate on the top surface, and on the backing sheet, all to prevent deflection.	
9.4.3.	Thermally fused laminate meets NEMA LI-1-1998. Low pressure laminate is not acceptable.	
9.5	Fabric	
9.5.1.	Abrasion resistance at a minimum meets ASTM D-3597 MVPTS-198 standards.	
9.5.2.	Flammability requirements adhere to ASTM E-84 (Tunnel Test) or Class A or 1 and the State of California Technical Bulletin 117 Sec. E (SC-191-53).	
9.5.3.	Fabric is made with a minimum of 75% recycled materials	
9.6.	Powder Coat	
9.6.1.	Must meet ASTM D3359-09 adhesion standard for	

	durability.	
9.6.2.	Must meet PCI #8 Solvent Cure Test for durability	
10.	ELECTRICAL REQUIREMENTS	
10.1.	Power Distribution & Load	
10.1.1.	Every console will have (2) Power Distribution Units (PDU). Single phase 15A 120V. Each PDU Unit must provide (13) NEMA 5-15R outlets and a NEMA 5-15P input. PDU unit must include a 15 foot cord. PDU must be UL listed and CSA rated.	
10.1.2.	Total power draw for an individual console will not exceed 13 amps. Total draw includes console lifting system and all environmental controls.	
10.2.	Wire and Cable Management	
10.2.1.	Must include two cable access drops with energy chains for vertical cable management from Input Support Surface to equipment enclosures.	
10.2.2.	Must include energy chains for vertical cable management from Monitor Support to Input Support Surface	
10.2.3.	Must include energy chains for horizontal cable management between moving surface and fixed surface.	
10.2.4.	A quick connect user-accessible interface with accommodations for up to 10 configurable ports must be available and must include full kits including ports, jacks and cables for: USB-A, PS/2, RJ45, RJ11/12 and 3.5mm stereo audio connection kits.	
10.2.5.	The quick connect interface base unit must also provide cable management for the equipment it serves, and the console infrastructure must support cable management from the user's position to the CPUs inside the console.	
10.2.6.	Must provide a horizontal cable raceway for long cable runs.	

10.2.7.	Horizontal cable raceway must be easily accessible and allow drop-in cable runs.	
10.2.8.	Cables routed within a furniture panel system will not be acceptable.	
11.	ENVIRONMENTAL CONTROL SYSTEM	
11.1.	Control Panel	
11.1.1.	Control panel for all environmental settings (task lighting, heating controls and air distribution) must be an integral part of the user interface and be mechanically fastened to the input surface.	
11.1.2.	Must be within primary reach zone (24") of the user.	
11.2.	ADA Compliance	
11.2.1.	System must offer an optional electronic adjustment control located within reach of a wheelchair to meet ADA requirements.	
11.3.	Air Distribution	
11.3.1.	System shall offer user-adjustable fans for circulating fresh air, with a minimum of 2 speed settings.	
11.3.2.	Fans shall be incorporated into the furniture design, providing maximum individualized control within the users primary work zone.	
11.4.	Lighting Levels	
11.4.1.	System shall provide indirect ambient lighting.	
11.4.2.	System shall provide flexible gooseneck style task lighting to allow proper placement of light over work area.	
11.4.3.	Lighting shall be mechanically fastened to console to prevent removal. Lights should be removable for maintenance.	
11.4.4.	System shall use integrated 12VDC LED lighting solutions.	

11.5.	Personal Heating	
11.5.1.	System shall provide two ceramic forced heating sources located under the Input Support Surface. 400 watts maximum to keep from working against the building HVAC.	
11.5.2.	Floor mounted heating solutions will not be acceptable.	
11.3.	Power Requirements	
11.6.1.	115 VAC, 60Hz	
11.6.2.	15 ft. power cord with 3-prong plug	
11.6.3.	0.3 amperes minimum draw, 6.0 amperes maximum draw	
12.	DOCUMENTATION	
12.1.	One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
13.	WARRANTY	
13.1.	Warranty = Five (5) Years (Vendor shall specify standard warranty and the extended warranty to provide 5 year total warranty coverage.)	
14.	MAINTENANCE	
14.1.1.	Summary of Preventative Maintenance	
14.1.2.	The Vendor will provide Preventative Maintenance to support the lifecycle of the furniture and to maintain the healthy work environment of the dispatch center.	
14.1.3	Services will be twice-yearly throughout the warranty period, with the option of an ongoing service agreement to cover the expected ten year lifecycle of the furniture.	
14.1.4.	Services will be provided either directly by the vendor or through an authorized subcontractor-dealer network.	

14.2.	Detail of Maintenance	
14.2.1.	Clean and vacuum cabinetry inside and out	
14.2.2.	Vacuum fabric panels front and rear	
14.2.3.	Attempt to remove stains from fabric panels	
14.2.4.	Inspect and repair edge molding on top and bottom of fabric panels	
14.2.5.	Vacuum under cavity shelves	
14.2.6.	Vacuum under console, utilizing specialized tool, for discarded food and particles than can cause allergens and attract pests.	
14.2.7.	Clean and wipe down all counters in and around the console	
14.2.8.	Clean and disinfect all high touch areas	
14.2.9.	Clean and disinfect all peripherals including keyboards, mice, phone, and input surfaces.	
14.2.10.	Inspect and/or replace post caps	
14.2.11.	Inspect alignment and fit of work surfaces to side surfaces	
14.2.12.	Re-level and orient primary surfaces	
14.2.13.	Inspect all consoles for level, return consoles to level	
14.2.14.	Align individual positions to room if necessary	
14.2.15.	Align and inspect doors under consoles and rear access doors	
14.2.16.	Inspect and/or replace door stops on foundation	
14.2.17.	We visually inspect all electrical (CPU, radio, USB, Ethernet and monitor) equipment for any anomalies including physical connections, frayed wires and other defects. Repair if furniture related; document and refer if not.	

14.2.18.	Re-fasten leg and comfort control wires	
14.2.19.	Replace broken wire management pieces and tie down wiring related to the mechanical lift portion of the console only.	
14.2.20.	Inspect all filters in the air controls units, replace filters as needed (for an additional cost)	
14.2.21.	Inspect and repair duct arms	
14.2.22.	Inspect fans and control units	
14.2.23.	Tuck and tighten cloth on panels.	
14.2.24.	Inspect and/or re-hang panels to posts	
14.2.25.	Tighten screws or bolts on mechanical parts or wire management.	
14.2.26.	Inspect all console lights and replace light bulbs as needed	
14.2.27.	Clean and disinfect keyboards, mice and monitors. Document defects and refer as needed.	
14.3.	Process and Equipment — as maintenance and cleaning will take place in an operating dispatch center, the follow are required to minimize disruption.	
14.3.1.	All maintenance personnel must satisfy the security requirements of the dispatch center.	
14.3.2.	Cleaning to be completed with fragrance-free, minimal-odor, environmentally safe, bio-degradable products. MSDS Sheets will be available for inspection when requested.	
14.3.3.	Vacuum cleaning equipment shall utilize HEPA filtration (99.9% of particles 1-micron or larger) and operate at less than 68-dB (A) sound level.	
14.3.4.	SHIPPING REQUIREMENTS – Contiguous U.S., F.O.B. All Destinations	

	Non-contiguous U.S., F.O.B. Port	
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11. INTEROPERABILITY GATEWAY DEVICES

Category Definition: Devices that interface multiple radios, of multiple makes and models, to analog telephones, to IP telephone networks, and to other devices; allowing multiple simultaneous voice communications to facilitate incident interoperability between respondents equipped with otherwise incompatible technologies; fixed, mobile, and portable devices; analog, digital, or IP-based devices; along with associated firmware and software, interface devices, connecting cables, and accessories.

Example Product: Quantity one (1) — IP Gateway Device Configured to Support a Mobile Command Post

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

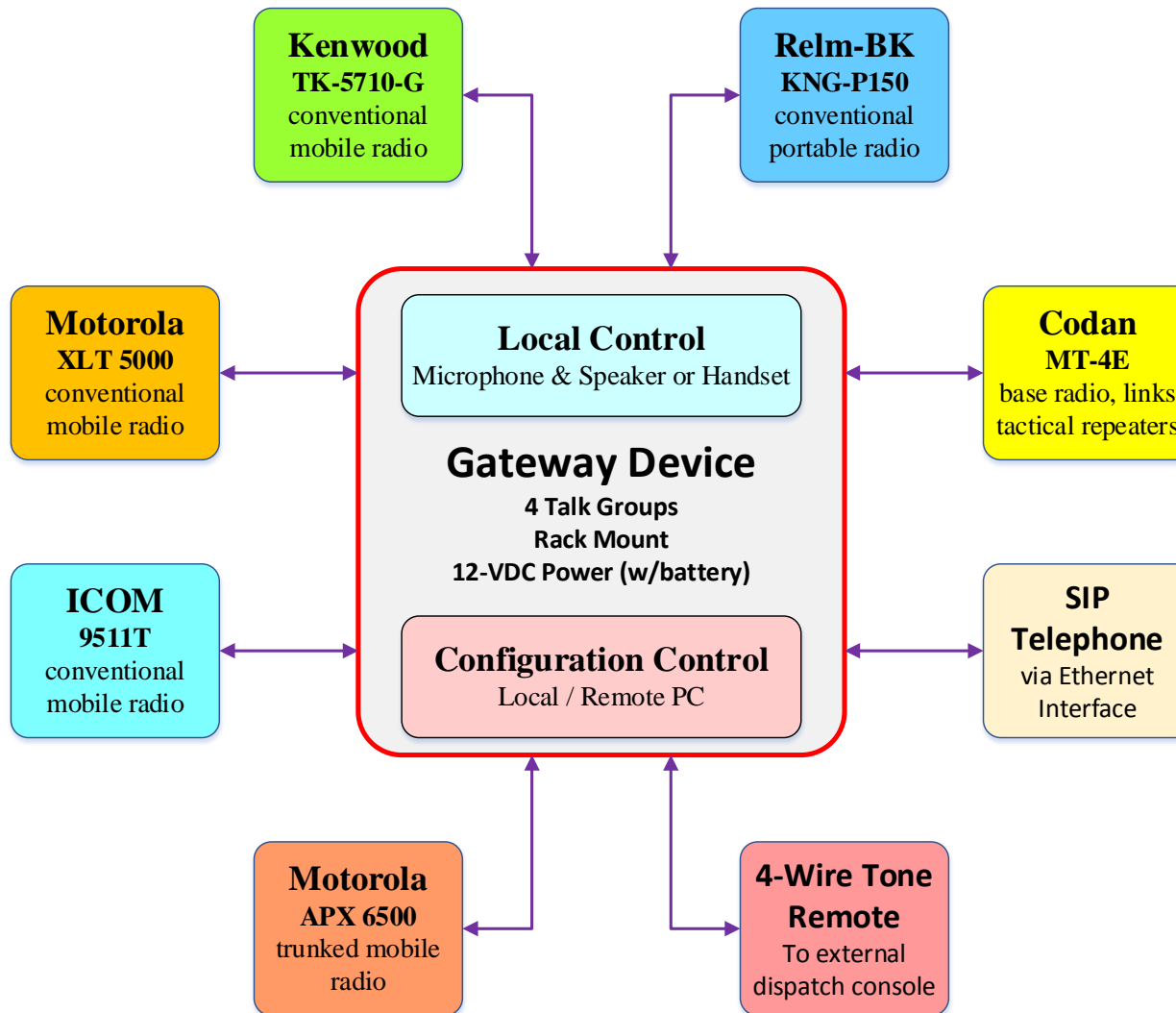
Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	GENERAL FEATURES	
1.1.	The device creates a Local Interoperability System, linking devices such as radios, telephones, or satellite phones into a unified communications system.	
1.2.	The device shall be configured with software control, supporting remote radios, SIP devices, and connections to other Local Interoperability Systems.	
1.3.	The device shall be capable of interfacing any standard	

	radio, as described above, to any analog or digital public telephone network (PSTN) or private branch exchange (PBX).	
1.4.	The device shall allow a minimum of four (4) cross-connect nets at one time (Talk-groups).	
2.	MOUNTING	
2.1.	Customer supplied standard 19 inch equipment rack (84 inch tall)	
3.	POWER	
3.1.	~12 VDC from Customer supplied power system	
3.2.	AC powered equipment shall be provided with an inverter to support operation on DC power.	
4.	CONTROLLER / OPERATING SYSTEM	
4.1.	The Operating System shall use a current version Windows-based operating system to provide a user-friendly interface depicting system operations, allowing programming of features, and providing password protection of features. (Customer supplied PC.)	
4.2.	The Operating System shall allow connection or disconnection of any channel to any other channel.	
4.3.	The Operating System shall provide for the programming of all interface features, such as public telephone interface, SATCOM interface, cellular interface, and two-way radio interface.	
4.4.	The Operating System shall provide the ability to create and store specific interoperability response combinations for pre-planning.	
4.5.	All Call: the Operating System shall provide for a quick	

	and easy broadcast of emergency messages over all channels simultaneously.	
4.6.	IP (RoIP) Interface	
4.7.	RJ-45 connector	
4.8.	10/100 base-T Ethernet, 100 Mbps	
4.9.	Audio delay and jitter buffers to handle network latency	
4.10.	Embedded COR, PTT, and audio vocoder	
5.	LOCAL OPERATOR CONTROL	
5.1.	Local control to modify configuration or select from available stored configurations	
5.2.	Local speaker, with volume control and speaker on/off	
5.3.	Microphone input with PTT	
5.4.	Headphone connection	
6.	IP TELEPHONE (SIP) INTERFACE	
6.1.	Standard: RFC 3261 or current modifications	
6.2.	SIP Support Vcoders: GSM and G711u, with auto-detect/select if the primary codec is not available.	
7.	TONE REMOTE INTERFACE (analog)	
7.1.	Standard: EIA tone remote	
7.2.	RJ-11 jack or terminals	
7.3.	Interface: selectable 2-Wire or 4-Wire, with selectable 600 ohm termination or hi-Z for parallel operation.	
7.4.	Levels: -20 dBm to +10 dBm, with AGC and/or compression to compensate for variations.	
8.	RADIO INTERFACES	

8.1.	Bidder shall supply interface cables to connect a wide range of user radios to the Gateway system.	
9.	SERVICE MANUAL - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
10.	WARRANTY – Five (5) Years (specify standard warranty and the extended warranty to provide 5 year total warranty coverage that includes all firmware and software updates.)	
11.	CONFIGURATION: Bidder shall provide the following configuration a hypothetical mobile command post for a multi-agency event. (<i>See illustration</i>)	
11.1.	Interface to one (1) Kenwood TK-5710-G conventional mobile radio	
11.2.	Interface to one (1) Motorola XLT 5000 conventional mobile radio	
11.3.	Interface to one (1) ICOM 9511T conventional mobile radio	
11.4.	Interface to one (1) Motorola APX 6500 trunked mobile radio	
11.5.	Interface to one (1) Relm-BK KNG-P150 conventional portable radio	
11.6.	Interface to one (1) Codan/Daniels MT-4E base radio, which links to tactical repeaters	
11.7.	Interface to one (1) SIP telephone	
11.8.	Interface to one (1) Tone Remote external dispatch console	
11.9.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	



12. CATEGORY: MICROWAVE RADIOS, CARRIER GRADE, PACKET DATA

Category: Microwave Radios, Carrier Grade, Packet Data — includes: Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; available in all-indoor or split system , capable of space diversity, fixed or adaptive modulation,; providing native IP with minimum MTU size of 2048, capable of transporting emulated TDM, with high throughput capacity; supporting N+1 hot standby, and/or XPIC, and/or ring redundancy; along with required bandwidth management / routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.

Example Product: 6 GHz microwave radio, all-indoor installation, space diversity, providing 150 Mbps data throughput, and 1+1 hot-standby. All antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. . It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis.

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	General Description	
1.1	Frequency Range: 5925 – 6425 MHz (Lower 6 GHz band) Plus 11 and 18 GHz Part 101 frequency bands	
1.2	Radio Type: Packet Data	
1.3	Link Throughput: 150 Mb per second data minimum	
1.4	Operate on a 30MHz RF channel, at 128QAM.	
1.5	Configuration: All-Indoor Installation	
1.6	Indoor Mounting: Customer supplied standard 19 inch wide — 84 inch tall equipment rack	
1.7	Electrical Power: Customer Supplied -48 VDC	

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.8	Licensing: Bidder to assume coordination and licensing have been successfully completed.	
2.	Technical Standards	
2.1	Frequency Tolerance: per FCC 101.107	
2.2	Channel Bandwidth: per FCC 101.109	
2.3	Emission limitations: per FCC 101.111	
2.4	Transmit Power: per FCC 101.113	
2.5	Operating Environment: per Telcordia GR-63 as applicable	
3.	OPERATIONAL PARAMETERS	
3.1	Transmit RF Power: < 22 dBm optional > 30 dBm	
3.2	Should be Capable of Automatic TX Power Control.	
3.3	Minimum Receive Threshold Level at TX/RX Unit Port: <-65dBm	
4.	Resiliency and Protection	
4.1	1+1 Hot Standby TX/RX plus Space Diversity	
5.	Network	
5.1	Interface: Copper Gig E Port or Optical Port	
5.2	Monitoring: SNMP Traps	
6.	One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
7.	Warranty – Five (5) Years (specify standard warranty and the extended warranty to provide 5 year total warranty coverage that includes all firmware and software updates.)	
8.	SHIPPING REQUIREMENTS: F.O.B. Destination Contiguous US F.O.B. Port Non-Contiguous US	

13. CATEGORY: MICROWAVE RADIOS, CARRIER GRADE, NATIVE TIME DIVISION MULTIPLEX (TDM)

Category: Microwave Radios, Carrier Grade, TDM — includes: Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; available in all-indoor or split system , capable of space diversity, fix or adaptive modulation; providing native TDM interface with high throughput capacity; supporting N+1 hot standby, and/or XPIC, and/or ring redundancy; along with required bandwidth management / routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.

Example Product: Lower 6 GHz microwave radio, all-indoor installation, space diversity, providing three (3) DS-3 throughput, and 1+1 hot-standby. All antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for a target product Mission Critical Public Safety Equipment. . It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis.

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	General Description	
1.1	Frequency Range: 5925 – 6425 MHz (Lower 6 GHz band) plus 11 and 18 GHz Part 101 frequency bands	
1.2	Radio Type: Native Time Division Multiplexed (TDM)	
1.3	Link Throughput: Three(3) DS-3	
1.4	Operate on a 30MHz RF channel, at 128QAM.	
1.5	Configuration: All-Indoor Installation	
1.6	Indoor Mounting: Customer supplied standard 19 inch wide — 84 inch tall equipment rack	
1.7	Electrical Power: Customer Supplied -48 VDC	

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.8	Licensing: Bidder to assume coordination and licensing have been successfully completed.	
2.	Technical Standards	
2.1	Frequency Tolerance: per FCC 101.107	
2.2	Channel Bandwidth: per FCC 101.109	
2.3	Emission limitations: per FCC 101.111	
2.4	Transmit Power: per FCC 101.113	
2.5	Operating Environment: per Telcordia GR-63 as applicable	
3.	OPERATIONAL PARAMETERS	
3.1	Transmit RF Power: >28 dBm, optional <30 dBm	
3.2	Should be Capable of Automatic TX Power Control.	
3.3	Minimum Receive Threshold Level at TX/RX Unit Port: <-65dBm	
4.	Resiliency and Protection	
4.1	1+1 Hot Standby TX/RX plus Receive Diversity	
5.	Network	
5.1	Interface: Copper DS-3	
5.2	Monitoring: SNMP Traps	
5.3.	Optional DS-3 to T1 Multiplex	
6.	One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
7.	Warranty – Five (5) Years (specify standard warranty and the extended warranty to provide 5 year total warranty coverage that includes all firmware and software updates.)	
8.	SHIPPING REQUIREMENTS: F.O.B. Destination Contiguous US F.O.B. Port Non-Contiguous US	

14. MICROWAVE RADIOS, NETWORK GRADE

Category: Microwave Radios, Network Grade— includes: Point-to-Point digital microwave radio equipment to operate on Part 101 licensed frequencies above 5925 MHz; capable of fix or adaptive modulation, RF power above +15 dBm; providing native packet data with high throughput capacity supporting emulated TDM over packet data; minimum MTU size of 2048; integrated or non-integrated antenna systems ; along with required bandwidth management / routing equipment and software; and with antennas, feedline systems, hardware (which may be from other manufacturers) to provide a complete system.

Example Product: 11 GHz microwave radio, split indoor-outdoor installation, providing 100 Mbps raw data throughput, non-integrated antenna system. All antenna system components and hardware, and routing equipment provided by the customer.

The following specifications and equipment configuration describes requirements for a target product Network Grade Public Safety Equipment. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis

Manufacturer:	NO BID
Product Model Name/Number:	

Item #	Description	Item #
1.	General Description	
1.1	Frequency Range: 5925-6425 MHz (6 GHz band) 10.7 – 11.7 GHz (11 GHz band)	
1.2	Radio Type: IP Packet	
1.3	Link Throughput: 100 Mb per second raw data	
1.4	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput	
1.5	Configuration: Split Indoor-Outdoor Installation	
1.6	Indoor Mounting: Customer supplied standard 19 inch wide – 84 inch tall equipment rack	
1.7	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison)	

1.8	Electrical Power: Customer Supplied -48 VDC	
1.9	Licensing: Bidder to assume coordination and licensing have been successfully completed.	
2.	Technical Standards	
2.1	Frequency Tolerance: per FCC 101.107	
2.2	Channel Bandwidth: per FCC 101.109	
2.3	Emission limitations: per FCC 101.111	
2.4	Transmit Power: per FCC 101.113	
2.5	Operating Environment: per Telcordia GR-63 and IEC 60721 class 4M5 IP67 as applicable	
3.	OPERATIONAL PARAMETERS	
3.1	Transmit RF Power: >15 dBm minimum	
3.2	Should be Capable of Automatic TX Power Control	
4.	Network	
4.1	Interface: Copper Gig E Port or Optical Port	
4.2	Monitoring: SNMP Traps	
5.	One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
6.	Warranty – Five (5) Years (specify standard warranty and the extended warranty to provide 5 year total warranty coverage that includes all firmware and software updates.)	
7.	SHIPPING REQUIREMENTS: F.O.B. Destination Contiguous US F.O.B. Port Non-Contiguous US	

15. MICROWAVE RADIO, NATIVE IP, SUB 5.9 GHz

Category Definition: Point-to-Point digital microwave radio equipment to operate on Part 15 unlicensed frequencies and on Part 90 and Part 101 licensed frequencies above 1 GHz and below 5.9 GHz; capable of RF power above +20 dBm; providing native packet data and analog interfaces; with mid to high throughput capacity; minimum MTU size of 2048; along with required bandwidth management / routing equipment and software.

Example Product: Quantity one (1) Terminal – 4.9 GHz microwave radio, providing 20 Mbps data throughput.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	GENERAL DESCRIPTION	
1.1.	Frequency Range: 4940 – 4990 MHz (4.9 GHz licensed public safety band)	
1.2.	Radio Type: Packet Data	
1.3.	Link Throughput: >20 Mb per second data	
1.4.	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput	
1.5.	Indoor Mounting: Customer supplied standard 19 inch	

	wide — 84 inch tall equipment rack	
1.6.	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison)	
1.7.	Electrical Power: Customer Supplied -48 VDC	
2.	TECHNICAL STANDARDS	
2.1.	Frequency Tolerance: per FCC 90.1201 through 90.1217 or most current standards	
2.2.	Channel Bandwidth: per FCC 90.1201 through 90.1217 or most current standards	
2.3.	Emission limitations: per FCC 90.1201 through 90.1217 or most current standards	
2.4.	Transmit Power: per FCC 90.1201 through 90.1217 or most current standards	
2.5.	Operating Environment: per Telcordia GR-63 as applicable and IEC 60721 class 4M5 IP67	
3.	OPERATIONAL PARAMETERS	
3.1.	Transmit RF Power: >15 dBm	
3.2.	Manual Transmitter Power Adjustment	
4.	NETWORK	
4.1.	Interface: Interface should be capable of supporting copper Ethernet or Optical interface supporting IP	
4.2.	Monitoring: SNMP Traps	
5.	SERVICE MANUAL - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by supporting technician.	
6.	WARRANTY – Five (5) Years	

	(specify standard warranty and the extended warranty to provide 5 year total warranty coverage that includes all firmware and software updates.)	
7.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

16. MICROWAVE RADIO, NATIVE IP, 900 MHz

Category Definition: Point-to-Point digital radio equipment to operate on Part 90 and Part 101 licensed frequencies below 3 GHz; capable of RF power above +25 dBm; providing native packet data with low throughput capacity; minimum MTU size of 2048; with digital and analog interfaces; along with antennas and associated hardware.

Example Product: Quantity one (1) Terminal – 900 MHz digital radio, providing >300 Kbps data throughput.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	GENERAL DESCRIPTION	
1.1.	Frequency Range: 928 - 960 MHz (900 MHz licensed OFS band with 9 MHz T-R split)	
1.2.	Radio Type: Packet Data	
1.3.	Link Throughput: >300 Kb per second data	
1.4.	Modulation & Bandwidth: as determined by bidder to achieve the specified link throughput	
1.5.	Indoor Mounting: Customer supplied standard 19 inch	

	wide — 84 inch tall equipment rack	
1.6.	Outdoor Mounting: feed location of antenna (antenna make and model shall be specified but not priced to provide equal comparison)	
1.7.	Electrical Power: Customer Supplied -48 VDC	
2.	TECHNICAL STANDARDS	
2.1.	Frequency Tolerance: per FCC 101.107 or most current standards	
2.2.	Channel Bandwidth: per FCC 101.109 or most current standards	
2.3.	Emission limitations: per FCC 101.111 or most current standards	
2.4.	Transmit Power: per FCC 101.113 or most current standards	
2.5.	Operating Environment: per Telcordia GR-63 as applicable and IEC 60721 class 4M5 IP67 or most current Operating Environment standards	
3.	OPERATIONAL PARAMETERS	
3.1.	Transmit RF Power: >25 dBm	
3.2.	TX Power Control Range: >15 dB Capability of manual transmitter power adjustment	
3.2	Optional N+1 redundancy and receive diversity	
4.	NETWORK	
4.1.	Interface: Capable of supporting copper Ethernet or Optical interface supporting IP	
4.2.	Monitoring: SNMP Traps	
5.	SERVICE MANUAL - One (1) set system documentation,	

	operations and service manuals, printed or electronic copy, for technician.	
6.	WARRANTY – Five (5) Years, includes all firmware and software updates.	
7.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

17. MONITORING & ALARM, ENVIRONMENTAL

Category Definition: Automated communication systems for collecting and transmitting environmental data for emergency notification (fire, flood, volcanic eruption, tsunami, etc.), along with all associated hardware, software, and accessories to complete and maintain the system.

Example Product: Quantity one (1) — Remote Automated Weather Station (RAWS) per NFDRS Standards

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Remote Automatic Weather Station should include the following: National Fire Danger Rating System NFDRS Remote automated Weather Station (RAWS) per National Wildfire Coordination Group standard PMS 426-3	
2.	Dedicated Data Acquisition System for AWS. (data logger)	
3.	The data logger should have battery-backed SRAM for CPU usage, program storage, and data storage for up to at least one million data values with upgradeable memory size at a later date without any hardware replacements and with inherent noise reducing facility. It should be compatible	

	with 12VDC power supply and should have programming and math functions capability for deriving calculated parameters with high program execution rate of up to 100 Hz for making fast measurements. It should have ability to implement conditional statements in the data logger programming. The Histogram instruction is required to process input data as either a standard histogram (frequency distribution) or a weighted value histogram. It should be possible to calculate the standard deviation of the Source over the output interval and store the results in a Data Table. The data logger should have ability to reject the 50Hz noise for accurate measurements. Special Software with Data logger should be provided to monitor various sensors.	
4.	Software: Special Software should be provided with Data logger to monitor various sensors.	
5.	Range and Auto Ranging: Support of +/-5VDC range and should have auto ranging facility apart from making measurements on following ranges specific to a channel: e.g., ±5000 mv, ±2500 mv, ±250 mv, ±25 mv, ±7.5 mv, ±2.5 mv, with resolution on the most sensitive range better than 0.5 microvolt.	
6.	Switched voltage excitations: The system should have switched outputs provided for precision excitation voltages.	
7.	DIGITAL I/O PORTS: Minimum eight ports should be provided for frequency measurements, digital control, and triggering.	
8.	SWITCHED 12 VOLT: Two independent 12 V unregulated sources switched on & off under program control.	
9.	Operating Temperature Range: -55° to +50°C	
10.	Enclosure: The data logger should be housed in a weatherproof enclosure of NEMA-IV rating.	

11.	Power Supply: Charger/Regulator 12VDC	
12.	Wall Adaptor AC-DC 120 VAC to 18 VDC	
13.	Cord with type-C plug	
14.	Battery 12V 7AH (minimum)	
15.	Sensors: (All sensors should be compatible with data logger, include mounting hardware and have a cable sufficient to allow mounting, and Operating Temperature: (40° to +60°C).	
16.	Air Temperature & Relative Humidity Sensor Combined:	
16.1.	Relative Humidity Measurement Range:0 to 100% RH, non-condensing	
16.2.	Output Signal Range: 0 to 2 V dc max.	
16.3.	Typical Long-Term Stability: Better than 1% RH per year	
16.4.	Voltage: 12 V dc Nominal or equivalent	
16.5.	Current Consumption: max 4 mA	
16.6.	PRT based Measurement Range: -40° to +60°C	
16.7.	Output signal range: 0 to 1.0 V	
17.	ATMOSPHERIC PRESSURE SENSOR:	
17.1.	Pressure Range 600 to 1100 hPa (mbar)	
17.2.	Operating Temperature -50 to +60°C Accuracy at least ±0.5 hPa (mbar) at -50 to +60°C.	
18.	SOLAR RADIATION SENSOR: - Pyranometer based	
18.1.	Light Spectrum Waveband: 400 to 1100 nm	
18.2.	Sensitivity: Typically 80 per1000	
18.3.	Wm-2 Linearity: Maximum deviation of 1% up to 3000 W	

	m-2 Accuracy: ±5%	
18.4.	Tipping Bucket Rain Gauge	
18.5.	Tips at 0.1 mm increments (0.004 in) Orifice diameter is max 24.5 cm (9.66 in) Accuracy is ±1% at rates up to 1 in per hr.	
18.6.	Output: Momentary switch closure activated by tipping bucket mechanism.	
18.7.	Environmental Limits: Temperature: 0° to +50°C and Humidity: 0 to 100% The bucket should have leveling arrangement for horizontal mounting.	
19.	WIND SPEED AND DIRECTION SENSOR: (Identify type, ie propeller, ultra sonic, etc.) (The sensor should be made out of rigid UV-stabilized thermoplastic with corrosion proof stainless steel and anodized aluminum fittings. The sensor should have stainless steel precision-grade ball bearings for the propeller shaft and vertical shaft bearings.)	
19.1.	Wind Speed Range: 0-100 m/s	
19.2.	Accuracy: ±0.3 m s	
19.3.	Starting threshold: 1.0 m/s	
19.4.	Wind Direction Range: 0-360°	
19.5.	Accuracy: ±3° Starting threshold: 1.1 m/s	
19.6.	Damping ratio: max 0.25 Output: Analog dc voltage from potentiometer linearity 0.25%	
20.	OPERATORS MANUAL - Operator manual shall identify the location of all switches, controls, indicators, and contain step-by-step instructions for operation of all capabilities.	
21.	WARRANTY - Contractor is responsible for all warranties required herein. Any warranty offered by the original goods	

	manufacturer shall not relieve contractor of this responsibility.	
21.1.	Base warranty 2 year minimum	
21.2.	Extended warranty up to 60 months	
21.3.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

18. MONITORING & ALARM, RADIO NETWORK

Category Definition: IP and analog radio network monitoring software & hardware, SCADA software & hardware, SNMP manager and agent software & hardware, remote terminal units (RTU), RF and radio site sensors.

Example Product: Quantity one (1) — Hypothetical radio system monitoring (RSM) configuration.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	OVERALL SPECIFICATION	
1.1.	The RSM shall provide indications, alarms and status of the equipment and systems being monitored that facilitate timely, precise interpretation of abnormal or	

	failed conditions within the radio network	
1.2.	The RSM shall consist of (a) server software {physical or virtual servers}, (b) IP and analog transmission paths, and (c) interfaces to remote equipment and/or sensors.	
1.3.	The RSM shall integrate into a single unified system alarm and status messages from multiple types of equipment from multiple manufacturers — such as radio repeaters, microwave radios, IP switches, power supplies, solar controllers, generators, HVAC equipment, and access control systems.	
1.4.	The RSM shall be designed to minimize the loss of status, alarm, and event messages during transmission to the server.	
1.5.	The RSM shall easily configured and expanded to accommodate additional inputs and monitored sites.	
2.	RSM Server	
2.1.	The RSM server software shall operate on a virtual-server environment. (Customer supplied and managed server.)	
2.2.	The RSM server shall operate within the network security and antivirus requirements of the customer agency. (Customer supplied and managed firewall and antivirus.)	
2.3.	The RSM server shall support multiple simultaneous access to status and alarm information	
2.3.1.	– Interface via a PC client for configuration and monitoring	
2.3.2.	– Interface via web client for access to monitoring.	
2.3.3.	– Interface via smart phone application for access to monitoring.	
2.4.	The RSM server shall support multiple password protected user accounts to manage system access	

2.4.1.	– Control access to (a) specific monitored equipment, (b) specific types of groups of equipment, or (c) specific sites, or (d) any combination.	
2.4.2.	– Provide multiple levels of access: (a) view only, (b) view and remote control, (c) view, remote control, and configure.	
2.5.	The RSM server software shall record and process alarm and status data according to individualized and categorized scripts, which include: severity of alarm, time of day, season, and on-call duty assignments.	
2.5.1.	RSM software shall provide logs of monitored parameters, alarms, and alarm responses. (Log capacity not specified; assumed to be a server capacity issue.)	
2.6.	The RSM server shall provide external messaging in response to alarm and status data:	
2.6.1.	– Messaging via SMTP (email)	
2.6.2.	– Messaging via SMS (text)	
2.6.3.	– Messaging via SNMP traps (to other systems)	
2.6.4.	– Messaging via SIP phone (voice messages).	
2.7.	The RSM server shall provide response escalation, sending additional messages and including additional recipients if the required acknowledgment is not received in the defined response time.	
2.8.	The RSM configuration shall be expandable to accommodate future additional sites and monitor inputs.	
3.	HYPOTHETICAL RADIO SYSTEM — The hypothetical radio system consists of a central dispatch center and two radio sites, with a separate radio shop that maintains the radio system.	
4.	Radio Shop — located on the same campus and with IP network connectivity to, the Dispatch Center. The radio	

	shop has the following resources that shall be integrated into RSM:	
4.1.	PC workstation (customer supplied) dedicated to configuration and monitoring of RSM.	
4.2.	Test radio for evaluation and maintenance of the radio system. RSM shall be configured to provide off-site access to the test radio for radio system evaluation as follows:	
4.2.1.	– Channel Change, via four separate contact closures to steer channel selection.	
4.2.2.	– PTT, via contact closure	
4.2.3.	– Transmit Indicator (TX)	
4.2.4.	– Receive Signal Strength Indicator (RSSI)	
5.	Dispatch Center — site is AC powered with backup generator, UPS, and DC power system. RSM shall monitor the following equipment and test points:	
5.1.	Backup Generator, which communicates using MOD BUSS protocol. RSM shall display the following: (all sensors provided as part of generator)	
5.1.1.	– Fuel Level	
5.1.2.	– Engine Temperature	
5.1.3.	– Oil Pressure	
5.1.4.	– Output Voltage	
5.1.5.	– Output Current	
5.2.	Uninterruptible Power System, which communicates using SNMP. RSM shall display the following:	
5.2.1.	– Incoming AC Line Voltage	
5.2.2.	– Output AC line voltage	
5.2.3.	– Output AC load	
5.3.	12VDC Power System with battery backup. RSM shall display the following:	

5.3.1.	– Output DC voltage	
5.3.2.	– Output DC current	
5.3.3.	– Battery Load Current (0-30 A)	
5.4.	Equipment Room Sensors	
5.4.1.	– Room Temperature Sensor	
5.4.2.	– Door Alarm (contact closure, customer supplied)	
5.4.3.	– Room smoke alarm (contact closure, customer supplied)	
5.5.	Codan MT-4E base radio, which provides analog link to radio #1 at site #1. RSM shall display the following:	
5.5.1.	– Transmit Indicator (TX)	
5.5.2.	– Receive Signal Strength Indicator (RSSI)	
5.5.3.	– Forward & Reflected RF Power — antenna line sensor installed at the output of filter cavities and circulators, which provides RS232 and Ethernets port – UDP/IP or SNMP interfaces (customer supplied)	
5.6.	IP Microwave to Radio Site #2, which communicates using SNMP. RSM shall report alarm indications provided by the SNMP.	
6.	Radio Site #1 — site is a solar powered with 12 VDC power system. Site communicates with Dispatch Center via analog radio. RSM shall monitor the following equipment and test points:	
6.1.	MorningStar Pro-Star solar power controller. RSM shall display the following:	
6.1.1.	– Solar Array Voltage (0-150 V)	
6.1.2.	– Output Voltage (nominal 12 V)	
6.1.3.	– Charge Current (0-30 A)	
6.1.4.	– Battery Load Current (0-30 A)	

6.2.	Building Alarms	
6.2.1.	– Room Temperature Sensor	
6.2.2.	– Door Alarm (contact closure, customer supplied)	
6.2.3.	– Smoke Alarm (contact closure, customer supplied)	
6.2.4.	– Water Intrusion Alarm (contact closure, customer supplied)	
6.3.	Codan MT-4E repeater radio.. RSM shall display the following:	
6.3.1.	– Transmit Indicator (TX)	
6.3.2.	– Receive Signal Strength Indicator (RSSI)	
6.3.3.	– Forward & Reflected RF Power — antenna line sensor installed at the output of filter cavities and circulators, which provides RS232 and Ethernets port – UDP/IP or SNMP interfaces (customer supplied)	
7.	Radio Site #2 — site is AC powered with 12 VDC and 48 VDC power systems. Site communicates with Dispatch Center via ethernet microwave. RSM shall monitor the following equipment and test points:	
7.1.	Backup Generator, which communicates using MOD BUSS protocol. RSM shall display the following: (all sensors provided as part of generator)	
7.1.1.	– Fuel Level	
7.1.2.	– Engine Temperature	
7.1.3.	– Oil Pressure	
7.1.4.	– Output Voltage	
7.1.5.	– Output Current	
7.2.	+12VDC Power System with battery backup. RSM shall display the following:	
7.2.1.	– Output DC voltage	

7.2.2.	- Output DC current	
7.2.3.	- Battery Load Current (0-60 A)	
7.3.	-48VDC Power System with battery backup. RSM shall display the following:	
7.3.1.	- Output DC voltage	
7.3.2.	- Output DC current	
7.3.3.	- Battery Load Current (0-60 A)	
7.4.	Building Alarms	
7.4.1.	- Room Temperature Sensor	
7.4.2.	- Door Alarm (contact closure, customer supplied)	
7.4.3.	- Smoke Alarm (contact closure, customer supplied)	
7.4.4.	- Water Intrusion Alarm (contact closure, customer supplied)	
7.5.	IP Microwave to Radio Site #1, which communicates using SNMP. RSM shall report alarm indications provided by the SNMP.	
7.6.	Quantity = 3, Motorola Quantar base radios, configured with RF combiner and receive multicoupler with one transmit and one receive antenna.	
7.6.1.	- Transmit Indicator (TX) {one per radio}	
7.6.2.	- Receive Signal Strength Indicator (RSSI) {one per radio}	
7.6.3.	- Forward & Reflected RF Power — TX antenna line sensor installed at the output of filter cavities and circulators, which provides RS232 and Ethernets port – UDP/IP or SNMP interfaces (customer supplied)	
8.	OPERATORS MANUAL: Operator manual shall identify the location of all switches, controls, indicators, and contain step-by-step instructions for operation of all capabilities.	
9.	WARRANTY: Three (3) Years	

	(Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
10.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

19. POWER SYSTEMS, DC CONVERSION

Category Definition: AC/DC converters, battery chargers, DC/DC converters, along with low voltage disconnect, DC breakers, power distribution panels, and associated hardware and software.

Example Product: Quantity one (1) — 12VDC 75 AMP Battery Charger

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Operates under extreme environmental Conditions	
1.1.	Automatic Power Factor Correction	
1.2.	Minimum average monthly PF of 0.95	
2.	Electrical	
2.1.	Input 120VAC 18.2 AMP	
2.2.	Output 13.6 VDC 75 AMP	
2.3.	Short Circuit Protection	
2.4.	Overload Protection	

2.5.	Thermal Protection	
2.6.	Temperature Range 32 to 104 degrees F	
3.	CORD CONFIGURATION: 1 NEMA 5-20P for a 20A receptacle	
4.	OPERATORS MANUAL: Operator manual shall identify the location of all switches, controls, indicators, and contain step-by-step instructions for operation of all capabilities.	
5.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
6.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

20. POWER SYSTEMS, FUEL CELL

Category Definition: Fuel-cell generators using either gaseous hydrogen or methanol fuel, along with specialized racks and/or cabinets, fuel storage subsystems, and installation materials.

Example Product: Quantity one (1) — 2.5 Kw Fuel Cell Backup DC Power Generator

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Maximum power 2,500W per chassis	
1.1.	Output voltage: 48 VDC nominal	
1.2.	Rated current: 52.5A @ 48V nominal	
1.3.	Fuel: Industrial grade hydrogen (99.95%)	
1.4.	Mounting: standard 23” equipment rack	
1.5.	Location: Indoors	
1.6.	Ambient Operating Temperature: 23°F to 122°F	

1.7.	Relative Humidity: 0-95% non-condensing	
1.8.	Altitude: < 13,800 ft	
1.9.	Emissions: water vapor < 32mL / kWh	
1.10.	Remote Monitoring: Provides system configuration, status, operational, and historical data	
1.11.	Communications: USB and Ethernet, SNMP and web interface	
2.	DOCUMENTATION: One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by technician.	
3.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
4.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

21. POWER SYSTEMS, ELECTRO-MECHANICAL GENERATORS

Category Definition: AC and DC power generators operating with diesel, gasoline or propane fuel. Indoor or Outdoor installation systems to include transfer switches, panels, monitoring, and controlling accessories including timing and sensing functions with related hardware and software.

Example Product: Quantity one (1) — 45KW propane fueled outdoor cabinet with automatic transfer switch, remote monitoring and control.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Backup Generator Set	
1.1.	Operates under extreme environmental conditions	
1.2.	Certified per latest EPA, UL and IBC Seismic standards	
1.3.	Meets or exceeds NFPA 110 Level 1 UL 2200	
1.4.	Meets FCC Title47 part 15 class B Radio Frequency Emissions	
1.5.	Meets EFP emissions, emergency, stationary, 40CFR60	
1.6.	Single fuel - propane field selectable	
1.7.	Meets WSDA Forest Service Sep-3001-1	

1.8.	Closed coolant recover system	
1.9.	Extended Oil and Coolant drains	
2.	Enclosure	
2.2.	Metal meets ASCE7-10 wind loads	
2.3.	Removable panels for easy repair/service	
2.4.	Designed with residential grade sound attenuation.	
2.5.	Rodent guards	
2.6.	Lockable door latches	
2.7.	Fade and Corrosion resistant finish	
3.	Electrical	
3.1.	One Phase 120/240 volt AC	
3.2.	60 Hz	
3.3.	175 amps (a 45KW generator will provide 188 amps)	
4.	Remote: Control / Monitoring System	
4.1.	Provide total system integration for ATS signaling auto start utility failure applications	
4.1.1.	Remote communications and adjustments via RS232 and/or Ethernet.	
4.1.2.	PC Control Software	
4.2.	Alarm and status message display, Data Logging and Fault Protection	
4.3.	Output metering	
4.4.	Remote starting/stopping	
4.5.	Frequency and voltage regulation	
4.6.	Auto-shutdown at fault detection	

4.6.1.	Engine protection faults to include, over speed, low oil pressure, High coolant Temp, Low coolant level, low coolant Temp, high and low battery voltage, over crank shut down, common fault relay with 3 configurable relays.	
4.7.	Meet NFPA 110 Level 1	
5.	Automatic Transfer Switch	
5.1.	One Phase 120/240 volt AC service rated 200 AMP with status relays	
5.2.	NEMA/UL Type 3 enclosure with lockable doors and controls	
5.3.	Functions	
5.3.1.	Utility voltage drop out, adjustable	
5.3.2.	Utility voltage pickup, adjustable	
5.3.3.	Timer to generator start adjustable, adjustable	
5.3.4.	Re-transfer time delay, adjustable	
5.3.5.	Engine cool down timer, adjustable	
5.3.6.	Exerciser , adjustable and optional remote capability	
6.	Operators Manual For Generator /ATS	
6.1.	Operator manual shall identify the location of all switches, controls, indicators, and contain step-by-step instructions for operation of all capabilities.	
6.1.1.	Parts and Service Manual at no charge	
6.2.	Owner Training: At site start-up and instructions, upon completion of installation, using existing building loads.	
6.3.	County of origin documentation (for Federally funded projects)	
7.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total	

	warranty coverage.)	
	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

22. POWER SYSTEMS, UNINTERRUPTABLE POWER SUPPLY (UPS)

Category Definition: Uninterruptible Power Systems, AC to AC, AC to DC double conversion on line, with associated installation wiring components, hardware and software, rack mount, vertical tower, free standing.

Example Product: Quantity one (1) — Uninterruptible Power System Double Conversion on line 120 VAC input 120VAC output 2100 watts/ 3000 VA.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Operates under extreme environmental Conditions	
1.1.	Temperature 32 to 104 degrees F	
1.2.	Elevation up to 10,000 ft.	
1.3.	Humidity 0% to 95%	
2.	Electrical	
2.1.	Power Factor Correcting	
2.1.	Input 120VAC NEMA L5-30P	
2.2.	Output (6) NEMA 5-15R (2) NEMA 5-20R	

2.3.	Internal Bypass (automatic and manual)	
3.	Run Time	
3.1.	4 Minutes Minimum Internal Battery 100% Load	
3.2.	90 Minutes Additional External battery 100% Load	
4.	Battery	
4.1.	Maintenance-free sealed lead-Acid	
4.2.	Recharge time 3.00 hours	
5.	Operators Manual - Operator manual shall identify the location of all switches, controls, indicators, and contain step-by-step instructions for operation of all capabilities.	
6.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
7.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

23. TEST EQUIPMENT, MULTIFUNCTION RADIO TEST SET

Category Definition: Specialized high-accuracy multi-function test instrument for the testing of two way radios. Includes: portable instruments, rugged field service instruments, laboratory instruments, along with related test adapters and accessories.

Example Product: Quantity one (1) — Compact multifunction instrument for testing and alignment of two-way radios (AKA: Radio Service Monitor)

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	Summary of Functions	
1.1.	AM/FM/P-25 Monitor	
1.2.	AM/FM/P-25 Generator	
1.3.	Duplex Generator	
1.4.	Signal Strength Meter	
1.5.	RF Power Meter	

1.6.	Spectrum Analyzer	
1.7.	Tracking Generator	
1.8.	RF Cable Fault Locator	
1.9.	Frequency Counter	
1.10.	Frequency Error Meter	
1.11.	AM Modulation Meter	
1.12.	FM Deviation Meter	
1.13.	SINAD/Distortion Meter	
1.14.	Audio Synthesizer	
1.15.	Oscilloscope	
1.16.	Digital Voltmeter	
2.	Time-Base	
2.1.	Temperature Stability = ± 0.15 ppm at -20° C to 70° C	
2.2.	Aging = 0.5 ppm First Year / 0.3 ppm After First Year	
3.	RF Generator (Receiver Test)	
3.1.	Port Input Protection	
3.1.1.	GEN Port: +20 dBm (Input Power Alarm Typical)	
3.1.2.	T/R Port: +49 dBm CW (Input Power Alarm Typical)	
3.1.3.	T/R Port: $>+90^{\circ}$ C (Temperature Alarm Typical)	
3.2.	Frequency	
3.2.1.	Range = 2 MHz to 1000 MHz	

	<2 MHz to 100 kHz Usable Range	
3.2.2.	Accuracy = Same as time-base	
3.3.3	Resolution = 1 Hz	
3.3.	Output Level	
3.3.1	Range <ul style="list-style-type: none"> - T/R Port: -50 to -125 dBm - ANT Port: -30 to -90 dBm - GEN Port: -5 to -65 dBm 	
3.3.2	Accuracy = ± 2 dB / ± 3 dB <-100 dBm	
3.3.3	Resolution = 1 dB	
3.4.	Signal Purity	
3.4.1.	Port VSWR < 1.5:1 (all ports)	
3.4.2.	SSB Phase Noise = -90 dBc/Hz at 20 kHz offset	
3.4.3.	Spurious <ul style="list-style-type: none"> - Harmonics = -30 dBc maximum, - Non-Harmonics = -40 dBc maximum (± 20 kHz offset from carrier; 0 to 1 GHz)	
3.4.4.	Residual FM <ul style="list-style-type: none"> - <20 Hz rms in 300 Hz to 3 kHz BW - <4 Hz rms, <100 MHz - <6 Hz rms, <800 MHz - <11 Hz rms, >800 MHz 	
3.4.5.	Residual AM <1% rms in 300 Hz to 3 kHz BW	

3.5.	ModulationTypes	
3.5.1.	1 kHz Tone	
3.5.2.	Private Line	
3.5.3.	Digital Private Line (w/ DPL Invert)	
3.5.4.	Single Tone	
3.5.5.	DTMF	
3.5.6.	Paging - Two-Tone & 5/6 Tone	
3.5.7.	External microphone & input connector	
3.6.	FM Modulation	
3.6.1.	Deviation Range = 0 to 75 kHz	
3.6.2.	Total Harmonic Distortion < 3%	
3.6.3.	Resolution < 10 Hz	
3.6.4.	Accuracy < ±10% (2 kHz to 50 kHz deviation)	
3.7.	AM Modulation	
3.7.1.	Range = 0 to 100%	
3.7.2.	Resolution < 1%	
3.7.3.	Total Harmonic Distortion < 3% (20% to 90% mod)	
3.7.4.	Accuracy < 10% of setting (20% to 90% mod)	
4.	RF RECEIVER (TRANSMITTER TEST)	
4.1.	Port Input Protection	
4.1.1.	ANT Port: +20 dBm (Input Power Alarm Typical)	

4.1.2.	T/R Port: +49 dBm CW (Input Power Alarm Typical)	
4.1.3.	T/R Port: >+90° C (Temperature Alarm Typical)	
4.2.	Frequency	
4.2.1.	Range = 2 MHz to 1000 MHz <2 MHz to 100 kHz Usable Range	
4.2.2.	Accuracy = Same as Time-base	
4.2.3.	Resolution = 1 Hz	
4.3.	Input Amplitude	
4.3.1.	Sensitivity <ul style="list-style-type: none"> - ANT: -110 dBm for 10 dB SINAD - T/R: -40 dBm for 10 dB SINAD 	
4.3.2.	Minimum Level Receiver Measurements <ul style="list-style-type: none"> - ANT: -80 dBm for RF Error Meter - T/R: -40 dBm for RF Error Meter 	
4.3.3.	DEMODO Meters <ul style="list-style-type: none"> - Modulation - Distortion - SINAD - AF Counter 	
4.4.	IF Bandwidth	
4.4.1.	FM: <ul style="list-style-type: none"> - 5 kHz, - 6.25 kHz, - 10 kHz, 	

	<ul style="list-style-type: none"> - 12.5 kHz, - 25 kHz, 	
4.4.2.	<p>AM:</p> <ul style="list-style-type: none"> - 5 kHz, - 6.25 kHz, - 10 kHz, - 12.5 kHz, - 25 kHz, - 30 kHz 	
4.5.	RF Frequency Error Meter	
4.5.1.	Units = Hz, PPM	
4.5.2.	Range = ± 200 kHz, ± 1000 PPM	
4.5.3.	Resolution = 1 Hz	
4.5.4.	Accuracy = Time-base ± 1 Hz	
4.6.	RF Power Meter (RF Power Into T/R Port)	
4.6.1.	Maximum Input Level = 50 Watts continuous	
4.6.2.	Input RF Power Alarm = +49 dBm	
4.6.3.	Temperature Alarm > +90° C	
4.6.4.	Meter Range = +20 to +53 dBm	
4.6.5.	Display Units = Watts, dBm	
4.6.6.	Resolution = 0.01 W, 0.1 dBm	
4.6.7.	Accuracy < 10% of reading	
4.7	FM Deviation Meter	

4.7.1.	Range = ± 500 Hz to ± 100 kHz	
4.7.2.	Meter Type = Peak+, Peak-, (Peak-Peak)/2, RMS	
4.7.3.	Resolution = 0.1 Hz	
4.7.4.	Accuracy < $\pm 5\%$ of reading, 1 kHz to 10 kHz Dev.	
4.8	AM Percent Meter	
4.8.1.	Range = 5% to 100%	
4.8.2.	Meter Type = Peak+, Peak-, (Peak-Peak)/2, RMS	
4.8.3.	Resolution = 0.001%	
4.8.4.	Accuracy = $\pm 5\%$ of reading	
4.9	SINAD Meter	
4.9.1.	Measurement Sources = Audio IN, DEMOD	
4.9.2.	Audio Frequency Notch = 1 kHz	
4.9.3.	Reading Range = 0 dB to 60 dB	
4.9.4.	Resolution = 0.001 dB	
4.9.5.	Accuracy < ± 1.5 dB,	
4.10.	Distortion Meter	
4.10.1.	Measurement Sources = AUD IN, DEMOD	
4.10.2.	Audio Frequency Notch = 1 kHz	
4.10.3.	Reading Range = 0% to 100%	
4.10.4.	Resolution = 0.001%	
4.10.5	Accuracy = $\pm 10\%$ of reading	

4.11.	Audio Frequency Counter	
4.11.1.	Measurement Sources = AUD IN, DEMOD	
4.11.2.	Frequency Range = 15 Hz to 20 kHz	
4.11.3.	Resolution = 0.1 Hz	
4.11.4	Accuracy < ± 1 Hz	
4.12.	Audio Frequency Level Meter	
4.12.1.	Measurement Sources = AUD IN, SCOPE	
4.12.2.	Input Range = <ul style="list-style-type: none"> - Audio In Range = 3 V, 30 V - Scope Range = 2 VDC, 40 VDC 	
4.12.3.	Frequency Range = 200 Hz to <5 kHz	
4.12.4.	Display Unit Resolution <ul style="list-style-type: none"> - Volts = 0.001 V - mV = 0.001 mV - dBuV = 0.001 dBuV - dBm = 0.001 dBm - Watts = 0.001 W 	
4.12.5.	Accuracy < $\pm 5\%$ AUD IN Port	
4.13.	Oscilloscope	
4.13.1.	Source = SCOPE, AUD IN, DEMOD	
4.13.2.	Bandwidth = 5 kHz	
4.14.	Digital Multimeter (DMM)	
4.14.1.	Functions	

	<ul style="list-style-type: none"> - AC/DC Voltmeter - AC/DC Ammeter - Ohmmeter 	
4.14.2.	Resolution = 3-1/2 digits (2000 counts)	
4.14.3.	Accuracy < ±5% AC, < ±2% DC	
4.15.	POWER	
4.15.1.	AC Input Voltage Range =100 to 240 VAC @ 47 Hz to 63 Hz (110-220 nominal)	
4.15.2.	DC Input Voltage Range = 12 to 32 VDC (12-24 nominal)	
4.15.3.	Battery Power, with full display backlight = 1.5 hours or more (Lithium-Ion battery)	
4.15.4	Battery Recharge, with unit on = 4 hours or less	
4.16.	ENVIRONMENTAL — tested in accordance with MIL-PRF-28800F, Class 3	
4.16.1.	Storage Temperature = -20° C to +60° C	
4.16.2.	Operating Temperature = 0°C to +40°C	
4.16.3.	Operating Relative Humidity = 5% to 80%	
4.16.4.	Operating Altitude = up to 10,000 feet	
4.16.5.	Shock = 30 G (Functional Shock)	
4.16.6.	Vibration = 5 to 500 Hz random vibrations	
4.17.	PHYSICAL	
4.17.1.	Dimensions = less than 14 in x 12 in x 8 in (width x height, depth)	

4.17.2.	Weight = less than 20 pounds	
4.17.3.	Case = Hard transit case	
5.	DOCUMENTATION - One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by technician.	
6.	WARRANTY – Five (5) Years, includes scheduled calibration and software/firmware updates. (Specify standard warranty and the extended warranty to provide 5 year total warranty coverage.)	
7.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

24. TEST EQUIPMENT, SPECIALIZED RF INSTRUMENTS

Category Definition: Specialized high-accuracy radio frequency instrument for the analysis of radio systems. Includes: Signal generators, signal analyzers, spectrum analyzers, vector network analyzers, power meters, antenna measurement instruments; and related specialized instruments, configured as portable instruments, rugged field service instruments, laboratory instruments; along with related test adapters and required accessories.

Example Product: Quantity one (1) — Portable & Spectrum Analyzer — a field instrument for the analysis of RF systems and the identification of interference.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	PHYSICAL /ENVIRONMENTAL	
1.1.	Dimensions: < 12” x 12” x 4”	
1.2.	Weight: < 8 lbs	
1.3.	Transit Shock/Drop: MIL-PRF-28800F Class 2	
1.4.	Operating Temperature: -10°C to +55°C	
1.5.	Operating Altitude: > 12,000 feet	
1.6.	RF Port Connectors: Type N, Female, 50 ohm	

1.7.	RF Input: > +20 dBm (100 mw)	
2.	POWER	
2.1.	External AC: 110/220 V nominal	
2.2.	External DC = 12 V nominal	
2.3.	Internal Battery > 3 hours run time	
3.	USER INTERFACE	
3.1.	Display: <ul style="list-style-type: none"> - > 6.5" flat panel, - Daylight viewable, - 99.999% good pixels. 	
3.2.	Intuitive User menus	
3.3.	Help files accessible from the user screen	
3.4.	PC Interface to configure and access files	
3.5.	Output files in standard format (PDF, DOC, etc.)	
3.6.	Data Interface: USB port	
3.7.	Data Storage, Internal: > 150 traces & settings	
3.8.	Data Storage, External: USB device capacity > 16GB	
4.	SPECTRUM ANALYZER	
4.1.	Frequency Range: > 100 kHz to 3.0 GHz	
4.2.	Reference Aging: ± 1 ppm / year	
4.3.	Tuning Resolution: 1 Hz	
4.4.	Spectral Purity: < -85 dBc @ 30 kHz	
4.5.	Sweep Time: 2.0 s, full span; 1 ms, zero span	
4.6.	Resolution Bandwidth: 100 Hz to 1 MHz RBW	

4.7.	Video Bandwidth: 10 Hz to 300 kHz VBW	
4.8.	Amplitude Accuracy: $< \pm 1.5$ dB	
4.9.	Dynamic Range: > 60 dB, intermod-free	
4.10.	Noise Floor: -135 dBm	
5.	DOCUMENTATION: One (1) set system documentation, operations and service manuals, printed or electronic copy, for use by technician.	
6.	WARRANTY: Five (5) Years, includes scheduled calibration and software/firmware updates. (Specify standard warranty and the extended warranty to provide 5 year total warranty coverage.)	
7.	SHIPPING REQUIREMENTS: F.O.B. All Destinations	

25. TOWERS, OVERALL SPECIFICATION

The following overall specification shall apply to all sub-category of tower product, as referenced within each specification below. ALL components must be new.

NOTE: In the event of conflict between specifications and the codes, standards, and practices here in, the most stringent requirement shall govern.

Item #	Description
1.	CODES AND STANDARDS
1.1.	American Institute of Steel Construction (AISC) — Manual of Steel Construction
1.2.	Electronic Industries Association (EIA) Standard RS-222 — Structural Standards for Antenna Towers and Antenna Supporting Structures
1.3.	American Welding Society (AWS) D1.1 — Structural Welding Code
1.4.	FAA Advisory Circular #AC 70/7460 — Obstruction Marking and Lighting
1.5.	National Electric Code (NEC) — Tower Lighting Kits
1.6.	American Institute of Steel Construction (AISC) — Specification for Structural Joints using ASTM A325 or A490 Bolts
1.7.	Federal Communications Commission Rules and Regulations - Part 17
1.8.	American Concrete Institute ACI 318 — Building Code Requirements for Reinforced Concrete
1.9.	American Society for Testing and Materials (ASTM) for:
1.10	A-36, A-50, A441 and A572 — Structural Steel
1.10.1.	A-123 — Zinc (hot-dipped galvanized coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars and strips)
1.10.2.	A-153 — Zinc Coatings (hot-dip) on Iron and Steel Hardware
1.10.3.	B-695 — Coatings of Zinc Mechanically Deposited on Iron and Steel (minimum thickness 0.0026")
1.10.4.	A-385 — Zinc Coatings (hot-dip) on Assembled Steel Products
1.10.5.	A-307 — Low-Carbon Steel Externally and Internally Threaded Standard Fasteners
1.10.6.	A-325 — High Strength Steel Bolts

1.10.7.	A-615 and A-706 — Reinforcing Bars
1.10.8.	ASTM C-9 — Ready-mixed Concrete
1.11.	The customer will arrange for building permits and advise the tower manufacturer of local codes and regulations that affect this specification.
1.12.	Where local ordinances specify higher standards than those represented in this specification, the local ordinances shall govern. Pertinent sections of those codes shall be provided by the customer to the tower manufacturer.
1.13.	The customer will report the results of special air navigational studies for marking and lighting towers. If special navigational reports are not a part of the contract, the tower vendor will apply the standards rules of the FAA, FCC and NEC when specified by the customer.
2.	ANALYSIS AND DESIGN
2.1.	Towers shall be designed by or under the direct supervision of a registered professional engineer, specifically experienced in the design of radio and microwave towers.
2.2.	All design and analysis computations and installation drawings shall be certified and stamped by a licensed Professional Engineer.
2.3.	The structure shall be designed to support all specified antennas, including future antennas, and to hold all antennas on path within the twist, sway and displacement limits of EIA RS-222. Where multiple frequencies are specified, the most critical twist, sway and displacement limits shall govern.
2.4.	The tower, when fully loaded with antenna assemblies, waveguide, and other appurtenances, shall be designed for the minimum wind loads as specified by EIA RS-222, unless otherwise specified.
2.5.	When specified by the customer, tower designs shall consider the concurrent accumulation of radial ice to all parts of the tower, antennas, and accessories. Loadings shall take into account both the resultant added wind load and dead load.
2.6.	Under wind pressures up to 35 mph (5 pst), all horizontal members shall be capable of supporting a 250 lb. vertical load at mid-span, in addition to all other design loads.
2.7.	Tower deflection limits are to be held both vertically and horizontally. Deflection must be determined at each specific point on the tower where an antenna is attached. The twist and sway of the tower at all antenna mounting elevations shall be determined by analytical methods and shall be noted on the formal stress analysis.
2.8.	The antenna loading (present and future) to be applied to the structure is as follows: (Customer to specify).
2.9.	The allowable unit stresses and the actual member stresses resulting from the specified design loads shall not exceed those given in the AISC specifications.
2.10.	All members of the structure shall be considered primary members for the purpose of establishing allowable compressive stresses per AISC,

	except those members whose sole function is to reduce the kl/r ratio of primary members.															
2.11.	For self-supporting and guyed tower footings, the safety factor for uplift shall be as described in EIA RS-222, latest edition.															
2.12.	Foundations shall be designed with sufficient reserve capacity to match the least tower leg reserve capacity.															
2.13.	Combined tower wind loads and antenna loads shall be applied in combination such that the maximum axial forces are produced in girts, diagonals, and legs. Multiple analyses may be necessary to ensure that worst case design conditions have been investigated.															
3.	TOWER PRODUCTS															
3.1.	Fabrication															
3.1.1.	All fabrication, erection and identification of structural steel shall conform to AISC specifications.															
3.1.2.	Under no circumstances shall "dissimilar metals" be used in contact with one another.															
3.1.3.	Hot-dipped galvanizing of tubular sections shall be inside and outside per standards and methods listed elsewhere in this specification.															
3.1.4.	Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."															
3.1.5.	Properly mark and match-mark materials for field assembly. Fabricate for a delivery sequence which will expedite erection and minimize field handling of materials.															
3.1.6.	If a round or tubular tower is provided vendor must supply a moisture drain hole at the base of the tower to ensure any accumulated moisture can drain from the bottom of the tower leg.															
3.2.	Connections and Locking Devices															
3.2.1.	No field welding shall be permitted unless specifically approved in writing.															
3.2.2.	All members shall be connected with galvanized structural bolts unless otherwise approved															
3.2.3.	The vendor shall provide bolts, nuts and lock-washers in a quantity in excess of the actual bolt count, for each size required for each tower site. <table border="1" data-bbox="319 1062 1085 1276"> <thead> <tr> <th>Bolt Count</th> <th>Percentage Excess</th> <th>Minimum Excess</th> </tr> </thead> <tbody> <tr> <td>0-200</td> <td>5%</td> <td>1</td> </tr> <tr> <td>200-500</td> <td>4 %</td> <td>10</td> </tr> <tr> <td>500-1000</td> <td>3%</td> <td>20</td> </tr> <tr> <td>1000 and over</td> <td>2 %</td> <td>30</td> </tr> </tbody> </table>	Bolt Count	Percentage Excess	Minimum Excess	0-200	5%	1	200-500	4 %	10	500-1000	3%	20	1000 and over	2 %	30
Bolt Count	Percentage Excess	Minimum Excess														
0-200	5%	1														
200-500	4 %	10														
500-1000	3%	20														
1000 and over	2 %	30														
3.2.4.	All towers will be provided with the correct size and length of anchor bolts necessary to carry the anticipated tower loads. If the tower loads															

	require more than one bolt per leg, they shall be shop welded into a cluster to eliminate the need for a template during field installation.
3.2.5.	All threaded fasteners shall extend not less than 1-1/2 threads beyond nuts and locking devices.
3.3	Climbing Ladders
3.3.1.	All climbing ladders will have an anti climb cover at the base of the tower that can be locked to prevent unauthorized use of the ladder.
3.4	Rest Platforms
3.4.1.	For towers greater than 50 feet in height, rest platforms shall be placed at intervals no greater than 50 feet.
3.4.2.	A rest platform will consist of a level platform of grating which allows room for one person to sit or stand.
3.5.	Work Platforms
3.5.1.	When work platforms are required they shall consist of level platforms of grating. They shall be either walkways with a minimum width of 24 inches or full coverage platforms and they shall provide reasonable access to appropriate work areas.
3.5.2.	Safety handrails shall be provided around the perimeter of the platforms with the upper railing at 42 inches above the deck and the intermediate rail approximately halfway between the top rail and the deck.
3.5.3.	Tower diagonals may be used to support platform handrails.
3.5.4.	When platform access is via an inside climbing ladder, a hatch shall be provided to eliminate the hazard of an access opening in the work area.
3.5.6.	Work platforms shall be designed to support two concentrated live loads of 250 lbs. each. Live loads imposed by persons on the platform shall be considered to concentrate at such points that will cause maximum stress in the structural members being considered.
3.6.	Finishes
3.6.1.	All steel members and fasteners shall be galvanized (zinc coated) per standards in Section 2.0 of this specification.
3.6.2.	Under no circumstances shall any coating on any metal member or fastener be cathodic relative to the base material.
3.6.3.	Use "Devcon", or equivalent, zinc rich paint, or approved equal, to touch up damaged galvanizing. Touch up may be done by either a spray or brush application.
3.6.4.	When required, tower structures shall be painted per FAA specification AC70/7460.
3.6.5.	All painting shall be performed in the shop using an acrylic latex paint specifically formulated for application to galvanized material.
3.6.6.	Field painting shall be limited to touch-up of paint damaged during transportation and erection. Use the same paint as was used in the shop to touch up damaged paint and provide the same protection as original shop painting.
4.	TOWER ACCESSORIES

4.1.	Tower Lighting
4.1.1.	When required, an obstruction lighting system shall be supplied with the tower and installed as required by FAA.
4.1.2.	All obstruction lighting equipment shall be FAA approved.
4.1.3.	Lighting shall be activated and deactivated by photoelectric control for unattended stations, and the method of activation for attended stations is to be specified.
4.1.4.	All wire shall be copper type THW-MTW grade 600 volt insulation installed in galvanized rigid conduit. All electrical installation shall conform to the National Electric Code requirements for outdoor installation.
4.1.5.	In accordance with FAA Circular 70/7460, towers in excess of 300 feet require multiple side lights. If the future tower height requires a side light configuration different than that being initially constructed, junction boxes will be placed at those points along the tower light conduit where future side lights would eventually be placed, along with necessary electrical wiring.
4.2.	Lightning Protection
4.2.1.	All towers shall be supplied with a complete grounding system which conforms to the minimum requirements of EIA RS-222, Section 12, and "Protective Grounding".
4.2.2.	Each tower with a height greater than 30 feet must be equipped with a lightning rod fastened at the extreme top of the tower.
4.2.3.	A galvanized steel lightning rod, with minimum dimensions of 5/8 inch diameter by 4 feet long, shall be attached so as to extend a minimum of 18 inches above the highest point of the tower, including all attachments.
4.2.4.	Ground rods shall be 5/8 inch diameter, 8 feet long, copper clad, and shall be driven not less than 8 feet into the ground.
4.2.5.	If ground rods cannot be driven to the full 8 foot depth, they may be driven on an angle or buried in a horizontal trench to allow the full 8 foot length to be buried.
4.2.6.	All grounding wire shall be not less than number 6 bare copper, and connected by use of the proper mechanical connectors.
4.2.7.	Any and all equipment mounted on the tower shall be so fastened as to be effectively grounded.
4.2.8.	Testing of grounding systems are the responsibility of the radio installer or others, not that of the tower vendor.
4.3.	Antenna Mounts
4.3.1.	Pipe mounts shall be plumb in each axis unless specified otherwise.
4.3.2.	Pipe mounts shall be positioned to prevent the antenna feed horn assembly from being directly opposite a tower member. Pipe mount positioning should not prevent direct waveguide installation to any antenna.

4.3.3.	Mounts and stiff arm support locations shall meet or exceed the standards specified by the antenna manufacturer in their latest installation bulletin.
4.3.4.	Waveguide support shall be engineered to provide supports at intervals not greater than 4 feet O.C. This support can be in the form of leg clamps, waveguide ladders or horizontal bridges.
4.3.5.	Waveguide support capacity shall provide for one waveguide run for each present and future antenna, unless otherwise specified.
4.3.6.	The waveguide bridge shall provide support and protection of waveguide runs between the tower and building structures.
4.3.7.	Waveguide support structures shall be grounded in accordance with the tower grounding specification.
4.3.8.	Wall entries must be specified by the customer in terms of sizes and number of openings required. They shall be designed and installed to be completely weatherproof and to accommodate all present and future waveguide runs.
5.	FOUNDATION DESIGN
5.1.	The vendor will be required to develop foundation designs based on soil conditions reported by the customer.
5.2.	Foundation recommendations contained within soils reports are general in nature and are made without benefit of tower reaction information. The ultimate authority and responsibility for the foundation design rests with the vendor.
5.3.	In the absence of a customer furnished soils report, normal soil conditions as described in EIA Standard RS-222 will be assumed .for the foundation design.
5.4.	Foundation designs should utilize, as a minimum, 3000 psi concrete and grade 40 reinforcing steel. When specified, a concrete mix design shall be submitted to the tower engineer to ensure that materials are proportioned by weight to produce concrete with a minimum compressive strength at 28 days of 3000 psi.
5.5.	Where a soil investigation indicates that adequate rock conditions exist, grouted anchors may be designed. Field tension testing shall be done when specified.
5.6.	When abnormal soil conditions are encountered to the extent that additional charges may be incurred, the customer must verify said conditions. Soil tests shall be provided by the customer.

26. TOWERS, ACCESSORIES & APPURTENANCES

Category Definition: Radio tower accessories, antenna stand-offs, antenna array mounts, ice shields, cable bridges, grounding materials, cable entry-panels, non-penetrating and ballasted antenna mounts, anti-climb panels, and related products.

Example Product: Quantity one (1) — Non-penetrating/ballasted antenna mount.

For Bidding Purposes: vendor shall assume that (1) customer will resolve all the building structural capacity issues, (2) manage all permits, (3) provide ballast material, and (4) contract for erection services.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	DESCRIPTION	
1.1.	Non-penetrating mount that provides a single mast	
1.2.	Load = One (1) panel antenna	
1.3.	Antenna Height = 10 feet	
1.4.	Roof Protection pads (1/2” rubber mat) are required	
2.	Conform to “OVERALL SPECIFICATION” requirements.	

3.	SITE INFORMATION	
3.1.	Location = Oregon, Willamette Valley, Portland metropolitan area	
3.2.	Flat roof of a typical warehouse building	
4.	ANTENNA DETAILS	
4.1.	Panel Antenna	
4.1.1.	Maximum Gust Speed = 200 kph	
4.1.2.	Wind Loading = 630 N @ 160 km/h	
4.1.3.	Wind Survival = 250 kph	
4.1.4.	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
4.1.5.	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
4.1.6.	Weight = 7.5 kgs Including Mounting Brackets	
4.1.7.	Lateral thrust (100 mph No Ice) 122 lbs	
4.1.8.	Torsional moment (100 mph No Ice) 132 ft-lbs	
4.1.9.	Bending moment (100 mph No Ice) 701 ft-lbs	
5.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
6.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

27. TOWERS, DEPLOYABLE / TEMPORARY

Category Definition: Deployable radio towers designed and constructed for temporary installation, fixed or transportable configurations, along with specially configured transport vehicles, accessories and appurtenances.

Example Product: Quantity one (1) — 40-foot extendable tower mounted on 16 foot enclosed cargo trailer for rapid deployment to tactical events.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	TOWER	
1.1.	Structure type: extendable guy wire supported	
1.2.	Maximum height: 40 feet	
1.3.	Maximum payload: > 120 pounds	
1.4.	Maximum antenna load: >15 ft. ²	
1.5.	Rated wind speed: 70 mph	
1.6.	Antenna mount: 2 inch diameter pipe, with > 72” extending above the tower.	

2.	TOWER MOUNTING / DEPLOYMENT	
2.1.	When retracted the tower shall tilt to horizontal position for transport atop the trailer.	
2.2.	A carried mechanism shall allow the tower to move from the stored position to a position where it can be tilted for deployment.	
2.3.	When in the vertical position, the tower sections shall be extended by means of a 12 V DC electric winch, with manual override.	
2.4.	All guy wire materials shall be supplied with the tower.	
2.5.	Guy wire anchors for normal soil conditions shall be supplied with the tower. (Other anchor configurations shall be available as options.)	
3.	TRAILER	
3.1.	Gross vehicle weight rating (GCWR): > 6500 lbs	
3.2.	Number of axles: 2 (tandem)	
3.3.	Overall width: < 102 inches	
3.4.	Overall length, excluding coupler: <22 feet	
3.5.	Coupler Size: Standard ball @ 2-5/16 inches	
3.6.	Electrical connector: Standard 7-pin	
3.7.	Electric brakes: all wheels	
3.8.	All DOT required lighting (LED), safety change, and breakaway switch with battery shall be included.	
3.9.	The trailer interior shall be open space ready for customization	
3.9.1.	Interior width: 96 inches	

3.9.2.	Interior height: > 76 inches	
3.9.3.	Interior length: > 200 inches	
3.10.	Doors: rear = full width; right front equal 36 inch	
4.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
5.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

28. TOWERS, GUYED

Category Definition: Guy wire supported type towers, tower engineering and design, foundation engineering and design, along with associated components and hardware.

Example Product: Quantity one (1) — 140-foot guy-wire-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Tower Type = Guy-Wire-Supported	
1.3.	Overall height = 140 feet, excluding lightning rod	

2.	Conform to “OVERALL SPECIFICATION” requirements.	
3.	SITE INFORMATION	
3.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills	
3.2.	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> - Ground Elevation = 3000 feet - 3.2x above Average Surrounding Terrain 	
3.3.	Exposure Classification C, open terrain without forest or significant structures.	
3.4.	Geotechnical = TIA 222 - Rev G “Presumptive Soil”	
3.5.	Site Access = gravel road	
3.6.	FAA Clearance = lighting not required	
4.	HEIGHT & LOAD INFORMATION <ul style="list-style-type: none"> - includes future capacity - refer to antenna details (section 5) 	
4.1.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per 5.1 below)	
4.2.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per 5.1 below)	
4.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per 5.4 below)	
4.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per 5.4 below)	
4.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice	

	shield – orientation = 270° (per 5.4 below)	
4.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per 5.3 below)	
4.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per 5.3 below)	
4.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per 5.3 below)	
4.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per 5.2 below)	
4.10.	@110-feet = Panel antenna, with mounts – orientation = 160° (per 5.2 below)	
4.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per 5.3 below)	
4.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per 5.3 below)	
4.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per 5.3 below)	
4.14.	@140-feet = Lightning Rod > 10-feet, to extend above topmost antenna.	
5.	ANTENNA DETAILS	

5.1.	Microwave Antenna	
5.2.	Antenna Diameter = 6 feet	
5.3.	Mounting Pipe Diameter = 4.5 in	
5.4.	Net Weight = 254 lbs	
5.5.	Wind Velocity Operational = 68 mph	
5.6.	Wind Velocity Survival Rating = 124 mph	
5.7.	<p>Wind Forces At Wind Velocity Survival Rating</p> <ul style="list-style-type: none"> - Angle α for MT Max = -130 ° - Axial Force (FA) = 1741 lbf - Side Force (FS) = 862 lbf - Twisting Moment (MT) = 2955 N/m - Weight with 1/2 in (12 mm) Radial Ice = 518 lbs - Zcg with 1/2 in (12 mm) Radial Ice = 26 in - Zcg without Ice = 18 in 	
5.8.	Panel Antenna	
5.8.1	Maximum Gust Speed = 200 kph	
5.8.2	Wind Loading = 630 N @ 160 km/h	
5.8.3	Wind Survival = 250 kph	
5.8.4	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
5.8.5	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
5.8.9	Weight = 7.5 kgs Including Mounting Brackets	

5.9.	Base Radio Antenna (Open Dipole)	
5.9.1	Depth = 4 in	
5.9.2	Length/ Height = 240 in	
5.9.3	Width = 26.5 in	
5.9.4	Base pipe diameter = 2.38 in	
5.9.5	Weight = 57.5 lbs	
5.9.6	Temperature range -40 to +140 °F	
5.9.7	Wind Loading Area (Flat Plate Equivalent) 3.34 ft ²	
5.9.8	Wind Loading Area (1/2" ice) 5.67 ft ²	
5.9.10.	Rated wind velocity (no ice) 135 mph	
5.9.11.	Rated wind velocity (1/2" radial ice) 95 mph	
5.9.12.	Lateral thrust (100 mph No Ice) 122 lbs	
5.9.13	Torsional moment (100 mph No Ice) 132 ft-lbs	
5.9.14	Bending moment (100 mph No Ice) 701 ft-lbs	
5.10.	Enclosed Yagi Antenna	
5.10.1	Depth = 11.5 in	
5.10.2	Length/ Height = 34.13 in	
5.10.3	Width = 11.5 in	
5.10.4	Base pipe diameter = 2.38 in	
5.10.5	Base pipe mounting length = 10.25 in	
5.10.6	Weight = 7.5 lbs	

5.10.7	Weight iced = 27.7 lbs	
5.10.8	Wind Loading Area (Flat Plate Equivalent) = 1.42 ft ²	
5.10.9	Wind Loading Area (1/2" ice) = 1.77 ft ²	
5.10.10.	Rated wind velocity (no ice) = 195 mph	
5.10.11.	Rated wind velocity (1/2" radial ice) = 175 mph	
5.10.12.	Lateral thrust (100 mph No Ice) 49.9 = lbs	
5.10.13.	Bending moment (100 mph No Ice) = 69 ft-lbs	
6.	Climb-Safety per " OVERALL SPECIFICATIONS "	
7.	Foundation design per " OVERALL SPECIFICATION " and identified site conditions.	
8.	PE stamped plans per " OVERALL SPECIFICATIONS "	
9.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
10.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

29. TOWERS, GUYED, LIGHT

Category Definition: Light duty lattice type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.

Example Product: Quantity one (1) — Light duty 60-foot self-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Tower Type = Self-Supported	
1.3.	Overall height = 60 feet, excluding lightning rod	

2.	Conform to “ OVERALL SPECIFICATION ” requirements.	
3.	LIGHT DUTY DEFINITION	
3.1.	Decreased height and loading requirements	
3.2.	Component transport in units of 10-feet or less	
3.3.	Erection can be accomplished without the use of heavy equipment	
4.	SITE INFORMATION	
4.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills	
4.2.	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> – Ground Elevation = 3000 feet – 3.2x above Average Surrounding Terrain 	
4.3.	Exposure Classification C, open terrain without forest or significant structures.	
4.4.	Geotechnical = TIA 222 - Rev G “Presumptive Soil”	
4.5.	Site Access = gravel road	
4.6.	FAA Clearance = lighting not required	
5.	HEIGHT & LOAD INFORMATION <ul style="list-style-type: none"> – includes future capacity – refer to antenna details (refer to antenna details in section 6) 	
5.1.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 100° (per 6.3 below)	
5.2.	@40-feet = Enclosed Yagi antenna, with mounts –	

	orientation = 200° (per 6.3 below)	
5.3.	@40-feet = Panel antenna, with mounts – orientation = 40° (per 6.1 below)	
5.4.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per 6.2 below)	
5.5.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 180° (per 6.2 below)	
5.6.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per 6.2 below)	
6.	ANTENNA DETAILS	
6.1.	Panel Antenna	
6.1.1.	Maximum Gust Speed = 200 kph	
6.1.2.	Wind Loading = 630 N @ 160 km/h	
6.1.3.	Wind Survival = 250 kph	
6.1.4.	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
6.1.5.	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
6.1.6.	Weight = 7.5 kgs Including Mounting Brackets	
6.2.	Base Radio Antenna (Open Dipole)	
6.2.1.	Depth = 4 in	

6.2.2.	Length/ Height = 240 in	
6.2.3.	Width = 26.5 in	
6.2.4.	Base pipe diameter = 2.38 in	
6.2.5.	Weight = 57.5 lbs	
6.2.6.	Temperature range -40 to +140 °F	
6.2.7.	Wind Loading Area (Flat Plate Equivalent) 3.34 ft ²	
6.2.8.	Wind Loading Area (1/2" ice) 5.67 ft ²	
6.2.9.	Rated wind velocity (no ice) 135 mph	
6.2.10.	Rated wind velocity (1/2" radial ice) 95 mph	
6.2.11.	Lateral thrust (100 mph No Ice) 122 lbs	
6.2.12.	Torsional moment (100 mph No Ice) 132 ft-lbs	
6.2.13.	Bending moment (100 mph No Ice) 701 ft-lbs	
6.3.	Enclosed Yagi Antenna	
6.3.1.	Depth = 11.5 in	
6.3.2.	Length/ Height = 34.13 in	
6.3.3.	Width = 11.5 in	
6.3.4.	Base pipe diameter = 2.38 in	
6.3.5.	Base pipe mounting length = 10.25 in	
6.3.6.	Weight = 7.5 lbs	
6.3.7.	Weight iced = 27.7 lbs	
6.3.8.	Wind Loading Area (Flat Plate Equivalent) = 1.42 ft ²	

6.3.9.	Wind Loading Area (1/2" ice) = 1.77 ft ²	
6.3.10	Rated wind velocity (no ice) = 195 mph	
6.3.11.	Rated wind velocity (1/2" radial ice) = 175 mph	
6.3.12.	Lateral thrust (100 mph No Ice) 49.9 = lbs	
6.3.13.	Bending moment (100 mph No Ice) = 69 ft-lbs	
7.	Climb-Safety per " Overall Specifications "	
8.	Foundation design per " Overall Specification " and identified site conditions.	
9.	PE stamped plans per " Overall Specifications "	
10.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
11.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

30. TOWERS, LATTICE

Category Definition: Self-supporting type towers (3-leg and 4 leg), tower engineering and design, foundation engineering and design, and associated components and hardware.

Example Product: Quantity one (1) — 140-foot self-supporting communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are to be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Tower Type = Self-Supporting, 3-Leg	

1.3.	Overall height = 140 feet, excluding lightning rod	
2.	Conform to “ OVERALL SPECIFICATION ” requirements.	
3.	SITE INFORMATION	
3.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills	
3.2.	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> – Ground Elevation = 3000 feet – 3.2x above Average Surrounding Terrain 	
3.3.	Exposure Classification C, open terrain without forest or significant structures.	
3.4.	Geotechnical = TIA 222 - Rev G “Presumptive Soil”	
3.5.	Site Access = gravel road	
3.6.	FAA Clearance = lighting not required	
4.	HEIGHT & LOAD INFORMATION <ul style="list-style-type: none"> – includes future capacity – refer to antenna details (section 5) 	
4.1.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per section 5.1 below)	
4.2.	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per section 5.1 below)	
4.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per section 5.4 below)	
4.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per section 5.4 below)	

4.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 270° (per section 5.4 below)	
4.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per section 5.3 below)	
4.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per section 5.3 below)	
4.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per section 5.3 below)	
4.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per section 5.2 below)	
4.10.	@110-feet = Panel antenna, with mounts – orientation = 160° (per section 5.2 below)	
4.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 5.3 below)	
4.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per section 5.3 below)	
4.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 5.3 below)	
5.	ANTENNA DETAILS	
5.1.	Microwave Antenna	

5.1.1.	Antenna Diameter = 6 feet	
5.1.2.	Mounting Pipe Diameter = 4.5 in	
5.1.3.	Net Weight = 254 lbs	
5.1.4.	Wind Velocity Operational = 68 mph	
5.1.5.	Wind Velocity Survival Rating = 124 mph	
5.1.6.	<p>Wind Forces At Wind Velocity Survival Rating</p> <ul style="list-style-type: none"> - Angle α for MT Max = -130 ° - Axial Force (FA) = 1741 lbf - Side Force (FS) = 862 lbf - Twisting Moment (MT) = 2955 N/m - Weight with 1/2 in (12 mm) Radial Ice = 518 lbs - Zcg with 1/2 in (12 mm) Radial Ice = 26 in - Zcg without Ice = 18 in 	
5.2.	Panel Antenna	
5.2.1.	Maximum Gust Speed = 200 kph	
5.2.2.	Wind Loading = 630 N @ 160 km/h	
5.2.3.	Wind Survival = 250 kph	
5.2.4.	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
5.2.5.	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
5.2.6.	Weight = 7.5 kgs Including Mounting Brackets	
5.3.	Base Radio Antenna (Open Dipole)	

5.3.1.	Depth = 4 in	
5.3.2.	Length/ Height = 240 in	
5.3.3.	Width = 26.5 in	
5.3.4.	Base pipe diameter = 2.38 in	
5.3.5.	Weight = 57.5 lbs	
5.3.6.	Temperature range -40 to +140 °F	
5.3.7.	Wind Loading Area (Flat Plate Equivalent) 3.34 ft ²	
5.3.8.	Wind Loading Area (1/2" ice) 5.67 ft ²	
5.3.9.	Rated wind velocity (no ice) 135 mph	
5.3.10.	Rated wind velocity (1/2" radial ice) 95 mph	
5.3.11.	Lateral thrust (100 mph No Ice) 122 lbs	
5.3.12.	Torsional moment (100 mph No Ice) 132 ft-lbs	
5.3.13.	Bending moment (100 mph No Ice) 701 ft-lbs	
5.4.	Enclosed Yagi Antenna	
5.4.1.	Depth = 11.5 in	
5.4.2.	Length/ Height = 34.13 in	
5.4.3.	Width = 11.5 in	
5.4.4.	Base pipe diameter = 2.38 in	
5.4.5.	Base pipe mounting length = 10.25 in	
5.4.6.	Weight = 7.5 lbs	
5.4.7.	Weight iced = 27.7 lbs	

5.4.8.	Wind Loading Area (Flat Plate Equivalent) = 1.42 ft ²	
5.4.9.	Wind Loading Area (1/2" ice) = 1.77 ft ²	
5.4.10.	Rated wind velocity (no ice) = 195 mph	
5.4.11.	Rated wind velocity (1/2" radial ice) = 175 mph	
5.4.12.	Lateral thrust (100 mph No Ice) 49.9 = lbs	
5.4.13.	Bending moment (100 mph No Ice) = 69 ft-lbs	
6.	Climb-Safety per " Overall Specifications "	
7.	Foundation design per " Overall Specification " and identified site conditions.	
8.	PE stamped plans per " Overall Specifications "	
9.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
10.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

31. TOWERS, LATTICE, LIGHT

Category Definition: Light duty lattice type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.

Example Product: Quantity one (1) — Light duty 60-foot self-supported communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Tower Type = Self-Supported	
1.3.	Overall height = 60 feet, excluding lightning rod	

2.	Conform to “OVERALL SPECIFICATION” requirements.	
3.	LIGHT DUTY DEFINITION	
3.1.	Decreased height and loading requirements	
3.2.	Component transport in units of 10-feet or less	
3.3.	Erection can be accomplished without the use of heavy equipment	
4.	SITE INFORMATION	
4.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills	
4.2.	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> - Ground Elevation = 3000 feet - 3.2x above Average Surrounding Terrain 	
4.3.	Exposure Classification C, open terrain without forest or significant structures.	
4.4.	Geotechnical = TIA 222 - Rev G “Presumptive Soil”	
4.5.	Site Access = gravel road	
4.6.	FAA Clearance = lighting not required	
5.	HEIGHT & LOAD INFORMATION <ul style="list-style-type: none"> - includes future capacity - refer to antenna details (section 6) 	
5.1.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 100° (per section 6.3 below)	
5.2.	@40-feet = Enclosed Yagi antenna, with mounts – orientation = 200° (per section 6.3 below)	

5.3.	@40-feet = Panel antenna, with mounts – orientation = 40° (per section 6.1 below)	
5.4.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 6.2 below)	
5.5.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 180° (per section 6.2 below)	
5.6.	@50-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 6.2 below)	
5.7.	@60-feet = Lightning Rod > 10-feet, to extend above topmost antenna.	
6.	ANTENNA DETAILS	
6.1.	Panel Antenna	
6.1.1.	Maximum Gust Speed = 200 kph	
6.1.2.	Wind Loading = 630 N @ 160 km/h	
6.1.3.	Wind Survival = 250 kph	
6.1.4.	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
6.1.5.	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
6.1.6.	Weight = 7.5 kgs Including Mounting Brackets	
6.2.	Base Radio Antenna (Open Dipole)	

6.2.1.	Depth = 4 in	
6.2.2.	Length/ Height = 240 in	
6.2.3.	Width = 26.5 in	
6.2.4.	Base pipe diameter = 2.38 in	
6.2.5.	Weight = 57.5 lbs	
6.2.6.	Temperature range -40 to +140 °F	
6.2.7.	Wind Loading Area (Flat Plate Equivalent) 3.34 ft ²	
6.2.8.	Wind Loading Area (1/2" ice) 5.67 ft ²	
6.2.9.	Rated wind velocity (no ice) 135 mph	
6.2.10.	Rated wind velocity (1/2" radial ice) 95 mph	
6.2.11.	Lateral thrust (100 mph No Ice) 122 lbs	
6.2.12.	Torsional moment (100 mph No Ice) 132 ft-lbs	
6.2.13.	Bending moment (100 mph No Ice) 701 ft-lbs	
6.3.	Enclosed Yagi Antenna	
6.3.1.	Depth = 11.5 in	
6.3.2.	Length/ Height = 34.13 in	
6.3.3.	Width = 11.5 in	
6.3.4.	Base pipe diameter = 2.38 in	
6.3.5.	Base pipe mounting length = 10.25 in	
6.3.6.	Weight = 7.5 lbs	
6.3.7.	Weight iced = 27.7 lbs	

6.3.8.	Wind Loading Area (Flat Plate Equivalent) = 1.42 ft ²	
6.3.9.	Wind Loading Area (1/2" ice) = 1.77 ft ²	
6.3.10.	Rated wind velocity (no ice) = 195 mph	
6.3.11.	Rated wind velocity (1/2" radial ice) = 175 mph	
6.3.12.	Lateral thrust (100 mph No Ice) 49.9 = lbs	
6.3.13.	Bending moment (100 mph No Ice) = 69 ft-lbs	
7.	Climb-Safety per " Overall Specifications "	
8.	Foundation design per " Overall Specification " and identified site conditions.	
9.	PE stamped plans per " Overall Specifications "	
10.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
11.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

32. TOWERS, MONOPOLE

Category Definition: Monopole type towers, tower engineering and design, foundation engineering and design, and associated components and hardware.

Example Product: Quantity one (1) — 140-foot monopole communications tower.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services. Note: (4) antenna mounts, stand-offs, ice-shields, and waveguide bridges are to be specified and priced under a separate sub-category.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Tower Type = Monopole	
1.3.	Overall height = 140 feet, excluding lightning rod	
2.	Conform to “ OVERALL SPECIFICATION ” requirements.	
3.	SITE INFORMATION	

3.1	Location = Oregon, east side of Willamette Valley, Cascade foothills	
3.2	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> - Ground Elevation = 3000 feet - 3.2x above Average Surrounding Terrain 	
3.3	Exposure Classification C, open terrain without forest or significant structures.	
3.4	Geotechnical = TIA 222 - Rev G "Presumptive Soil"	
3.5	Site Access = gravel road	
3.6	FAA Clearance = lighting not required	
4.	HEIGHT & LOAD INFORMATION <ul style="list-style-type: none"> - includes future capacity - refer to antenna details (section 15) 	
4.1	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 220° (per section 15.1 below)	
4.2	@40-feet = Microwave antenna, with mounts and ice shield – orientation = 130° (per section 15.1 below)	
4.3.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 100° (per section 15.4 below)	
4.4.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 180° (per section 15.4 below)	
4.5.	@60-feet = Enclosed Yagi antenna, with mounts and ice shield – orientation = 270° (per section 15.4 below)	
4.6.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 0° (per section 15.3 below)	

4.7.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 120° (per section 15.3 below)	
4.8.	@80-feet = Base Radio antenna, with bottom and top mounts and 4-foot side arms – orientation = 240° (per section 15.3 below)	
4.9.	@110-feet = Panel antenna, with mounts – orientation = 40° (per section 15.2 below)	
4.10	@110-feet = Panel antenna, with mounts – orientation = 160° (per section 15.2 below)	
4.11.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 0° (per section 15.3 below)	
4.12.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 120° (per section 15.3 below)	
4.13.	@130-feet = Base Radio antenna, with bottom and center mounts and 4-foot side arms – orientation = 240° (per section 15.3 below)	
5.	ANTENNA DETAILS	
5.1.	Microwave Antenna	
5.1.1.	Antenna Diameter = 6 feet	
5.1.2.	Mounting Pipe Diameter = 4.5 in	
5.1.3.	Net Weight = 254 lbs	
5.1.4.	Wind Velocity Operational = 68 mph	
5.1.5.	Wind Velocity Survival Rating = 124 mph	

5.1.6.	<p>Wind Forces At Wind Velocity Survival Rating</p> <ul style="list-style-type: none"> - Angle α for MT Max = -130 ° - Axial Force (FA) = 1741 lbf - Side Force (FS) = 862 lbf - Twisting Moment (MT) = 2955 N/m - Weight with 1/2 in (12 mm) Radial Ice = 518 lbs - Zcg with 1/2 in (12 mm) Radial Ice = 26 in - Zcg without Ice = 18 in 	
5.2	Panel Antenna	
5.2.1.	Maximum Gust Speed = 200 kph	
5.2.2.	Wind Loading = 630 N @ 160 km/h	
5.2.3.	Wind Survival = 250 kph	
5.2.4.	Mounting = Twin Vertically Spaced Clamps for Attachment to 20-115 mm Mounting Pipe	
5.2.5.	Dimensions: W x H x T = 930 x 500 x 60 mm (+ Mounting Brackets)	
5.2.6.	Weight = 7.5 kgs Including Mounting Brackets	
5.3	Base Radio Antenna (Open Dipole)	
5.3.1.	Depth = 4 in	
5.3.2.	Length/ Height = 240 in	
5.3.3.	Width = 26.5 in	
5.3.4.	Base pipe diameter = 2.38 in	
5.3.5.	Weight = 57.5 lbs	
5.3.6.	Temperature range -40 to +140 °F	

5.3.7.	Wind Loading Area (Flat Plate Equivalent) 3.34 ft ²	
5.3.8.	Wind Loading Area (1/2" ice) 5.67 ft ²	
5.3.9.	Rated wind velocity (no ice) 135 mph	
5.3.10.	Rated wind velocity (1/2" radial ice) 95 mph	
5.3.11.	Lateral thrust (100 mph No Ice) 122 lbs	
5.3.12.	Torsional moment (100 mph No Ice) 132 ft-lbs	
5.3.13.	Bending moment (100 mph No Ice) 701 ft-lbs	
5.4.	ENCLOSED YAGI ANTENNA	
5.4.1.	Depth = 11.5 in	
5.4.2.	Length/ Height = 34.13 in	
5.4.3.	Width = 11.5 in	
5.4.4.	Base pipe diameter = 2.38 in	
5.4.5.	Base pipe mounting length = 10.25 in	
5.4.6.	Weight = 7.5 lbs	
5.4.7.	Weight iced = 27.7 lbs	
5.4.8.	Wind Loading Area (Flat Plate Equivalent) = 1.42 ft ²	
5.4.9.	Wind Loading Area (1/2" ice) = 1.77 ft ²	
5.4.10.	Rated wind velocity (no ice) = 195 mph	
5.4.11.	Rated wind velocity (1/2" radial ice) = 175 mph	
5.4.12.	Lateral thrust (100 mph No Ice) 49.9 = lbs	
5.4.13.	Bending moment (100 mph No Ice) = 69 ft-lbs	
6.	Climb-Safety per " OVERALL SPECIFICATIONS "	

7.	Foundation design per “ OVERALL SPECIFICATION ” and identified site conditions.	
8.	PE stamped plans per “ OVERALL SPECIFICATIONS ”	
9.	WARRANTY: Minimum One (1) Year (Vendor shall specify standard warranty and additional extended warranty options)	
10.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	

33. TOWERS, PASSIVE MICROWAVE REPEATER

Category Definition: Passive microwave repeater (reflector) structures, structure engineering and design, foundation engineering and design, and associated components and hardware.

Example Product: One - 20 foot by 32 foot passive microwave repeater.

For Bidding Purposes: Vendor shall assume that (1) customer will supply geotechnical report, (2) manage all permits, and (3) contract for foundation and tower erection services.

The following specifications and equipment configuration describes requirements for the EXAMPLE PRODUCT. It is the Bidder’s responsibility to fully describe or explain how the product offered meets or exceeds each identified requirement. If more space is needed, Bidders may submit additional pages (up to a maximum equivalent of five single-sided pages – 12 point font). Only one product may be offered to meet or exceed these specifications on a pass/fail basis. (Reference Section 4.15 Specifications, Part I Solicitation Document)

Manufacturer:	NO BID
Product Model Name/Number:	

Vendors should submit descriptive literature for the product offered confirming its compliance with specifications.

Note: Symbols for less-than (<) or greater-than (>) shall be interpreted to include equal-to the specified value. The symbol for approximate (~) indicates an imprecise or nominal value where variations will be acceptable.

Item #	Description	Describe/explain how Vendor meets or exceeds specifications
1.	SUMMARY DESCRIPTION	
1.1.	ANSI/EIA/TIA-222-G or current nationally approved standard, Structure Classifications III, Essential Communications.	
1.2.	Structure Type = Passive Microwave Repeater (Reflector)	
1.3.	Size = 20 feet by 32 feet	

2.	Conform to “ OVERALL SPECIFICATION ” requirements.	
3.	SITE INFORMATION	
3.1.	Location = Oregon, east side of Willamette Valley, Cascade foothills	
3.2.	Topographical Category 3, located at the top of a hill <ul style="list-style-type: none"> - Ground Elevation = 3000 feet - 3.2x above Average Surrounding Terrain 	
3.3.	Exposure Classification C, open terrain without forest or significant structures.	
3.4.	Geotechnical = TIA 222 - Rev G “Presumptive Soil”	
3.5.	Site Access = gravel road	
4.	Foundation design per “ OVERALL SPECIFICATION ” and identified site conditions.	
5.	PE stamped plans per “ OVERALL SPECIFICATIONS ”	
6.	WARRANTY: Three (3) Years (Vendor shall specify standard warranty and the extended warranty to provide 3 year total warranty coverage.)	
7.	SHIPPING REQUIREMENTS: Contiguous U.S., F.O.B. All Destinations Non-Contiguous U.S., F.O.B. Port	