

**STATEMENT OF OBJECTIVES (SOO)
For**

**Installation of Towers, Shelter and
Upgrade of RF Infrastructure
For
Air Traffic Control**

Mountain Home AFB ID

Draft: 4 October 16

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1. INTRODUCTION.

This Statement of Objectives (SOO) defines the requirements for the contractor to engineer, furnish, install and test (EFI&T) the installation of two (2) new 100-foot free standing towers to replace the existing tower currently in use. The towers will be populated with new antennas, RF cabling, lightning protection, and lighting. In addition, a new equipment shelter will be installed to house new government provided radios and racks to establish a new radio facility to replace the existing building. Likewise, the ATC tower and RAPCON will have new antennas installed along with new government furnished radios and racks for backup operations.

2. REQUIREMENTS.

Unless otherwise specifically noted herein, the contractor shall provide all equipment, tools, materials, supplies, transportation, labor, supervision, management, and other incidentals necessary to meet the requirements as stated in this SOO. All equipment, supplies, and materials provided shall be new and not refurbished. Any Government Reused Equipment (GRE) is identified in section 2.2.1. Since this is an operational facility, contractor must plan work sequences to ensure the amount of downtime is limited.

Thus, the new towers and support equipment need to be in place prior to any removals. This allows continued operation of existing systems until just prior to cutover. The site location is located on Mountain Home AFB ID. Contractor must be prepared to provide their own toilet facilities and water sources. Power connections for tools are available at the site. Refer to the attached sketches and standards for additional details regarding site layout, tower install, and junction box setup.

2.1. Specific Project Details for this Contract.

Items in paragraphs below must be included as part of any proposal submitted by the contractor with all costs for labor, equipment, supplies, rentals, and subcontracted services identified in the proposal. This section outlines what is to be done within the scope of this contract. Refer also to attached sketch and standard for additional information. Prior to any concrete work being accomplished, the contractor will have a soil pressure test completed to verify that the tower foundation design is adequate for the site.

Unless otherwise noted, all items described in the paragraphs below are contractor responsibility.

Section 2.1.1 covers the main GATR site upgrade. Section 2.1.2 covers the ATC Tower/RAPCON RF infrastructure upgrade.

2.1.1. Upgrade of Main GATR Site Infrastructure

2.1.1.1. Install New Concrete Pad and Shelter

Install a new concrete support pad for a 12-ft x 20-ft pre-manufactured shelter at the approximate location shown on the attached sketch for the site layout. Contractor must submit an AF form 103 (digging permit) to base Civil Engineering with sufficient lead time to obtain approval. Pads will have a 6-inch elevation above ground where the shelter sits. Concrete will be cured and pass a break test prior to weight being placed on the

pad. Additionally, the shelter will also have a 6-foot concrete apron in front of the entry doors the width of the shelter. Shelter will be secured to the pad, and have a wind rating of at least 90 mph. Entry door will be a 6-foot double door. Attached sketch shows the desired layout and approximate location of equipment to be provided with the shelter. Shelter will have dual HVAC units, overhead cable trays and power ducts that allow cable transition to all racks. Each rack will have a separate circuit breaker of at least 20-amps. Shelter will be equipped with a cipher-type lock suitable for exterior mounting, and a fire transmitter and antenna installed. Foundations must have a professional engineering seal that verifies the design is suitable for the expected wind load for the shelter. A halo ground ring will be installed around the shelter with ground rods and connected to the ground ring for the generator and the tower.

2.1.1.2. Install New Power Connection.

The contractor will trench and install a new power connection via buried PVC, from existing building 3502. The generator and ATS in that building will remain in that building and will be reused to support the new shelter. All connections and cabling for power must adhere to the National Electric Code. The existing rack mounted UPS units in the existing building 3502 will be relocated and reused with the new radios/racks. No new UPS will be installed.

2.1.1.3. Install New Concrete Foundations for Towers

Contractor shall install 2 concrete reinforced foundations with the tower embedment bases at the approximate locations IAW tower assembly drawings provided by the tower vendor. Any foundation designs used, other than the manufacturer recommended layout, must be designed by a professional engineering firm and have their Professional Engineering seal affixed to the drawing to show it meets the requirements for the applicable tower standard paragraphs in TIA-222/G. Note that the buried PVC for the 7/8" heliax also needs to be embedded at the time of the foundation pouring.

2.1.1.4. Excavate Trenches for PVC, Ground Leads, and Power Conduit.

Trenches will be excavated for each tower from the tower base to the area on the existing building directly below the location for each stainless steel junction box. Depth of trench shall be approximately 24 inches. Each trench will contain 4 runs of 4-inch PVC (Schedule 40 or better) for the 7/8" heliax, plus a suitably sized galvanized pipe for the 120 VAC power line used to operate the obstruction light.

NOTE: The PVC runs must sweep up the tower at the base, and must be embedded in the foundation base (see para 2.1.1.3). Open trenches must have warning tape or barriers until the trenches are filled in and compacted.

2.1.1.5. Install New 100-ft Self Supporting Towers

Install a new free standing 100-ft metal tower at each new foundation location as described in the attached sketch. Tower foundations must be cured and a successful concrete stress test performed before the main tower sections are installed on the embedded base. Tower must meet TIA-222/G standards and have a wind rating of at least 90 mph (no ice) and have 8 antenna positions. See Contractor Furnished Equipment (CFE) table (para 2.2.2) for more details on the tower requirements. As previously noted, any contractor provided tower and foundation must have a Professional Engineering seal affixed to the design drawings, and be submitted for review and approval prior to implementation. This will not be required if a COTS tower and foundation design is used (e.g., Antenna Products) that provides such seal as part of the tower. As these towers are used for air traffic control, the linearity of the tower follows the standards in FAA Order 6930.25A. After tower has been fully installed, a transit measurement for perpendicularity will be performed by the contractor and witnessed by base personnel. Tower must not have more than 1 part in 250 deviation from top of tower to foundation. For a 100-foot tower this equates to 4.8" total deviation. Crane lifting plan shall be submitted for approval 14 days prior to planned lift.

2.1.1.6. Install New Ground Ring for Towers.

A new halo ground ring with 10-ft copper ground rods at each corner of each tower foundation will be installed at the base of each new 100-ft tower. The ring will also be tied to the ground connection for the

existing building. The ground lead will be run thru the trench (see para 2.1.2) used for the PVC runs. A test point for ground measurements will be installed at each tower (one test point per tower) and be covered in a PVC casing with an above ground cap to allow maintenance access to the test point. Tower legs will be separately tied to the halo ground from each tower leg base. All ground wire connections will be cad welded or use high compression crimps (including connection to ground rods). Cable clamps are not sufficient. Ground resistance measurements for ground rings will be 10 ohms or less from the test point to ground. Additional ground rods will be added by the contractor to achieve 10-ohms (if needed). Once all ground leads and lightning down leads (see section below) are connected and tested, the entire ground halo will be buried below ground level sufficient to prevent accidental contact by personnel working around the tower. However, (as noted above) the test points must be made available for future test access by covering them with a PVC cap that can be removed for test point access. Foundations will have approximately 2" reveal above ground level along outer edges to allow for ease of lawn mowing and trimming.

2.1.1.7. Install New Antennas

Each tower will be populated with 4 dual port and 4 single port antennas. The UHF/VHF frequencies in use at the base will be equally distributed to the two towers. Higher priority frequencies requiring longer range will use single port antennas to the maximum extent possible. Each tower will have one spare dual port antenna with one UHF and one VHF port available for future expansion. The base will provide a frequency list to the contractor. Antennas will be mounted on tower standoffs and platform mounts provided with the tower and will be grounded at the base to the tower.

2.1.1.8. Install RF Cabling, Junction Boxes, and Surge Arrestors

2.1.1.8.1. RF Cables.

New 7/8 " heliax cables (Andrews/ AVA5-50FX, or equivalent) will be installed from each tower mounted stainless steel junction box , and routed down the tower, thru the buried PVC to a new stainless steel junction box that will be mounted on the existing building (para 2.1.6.2). There will be 12 total 7/8" heliax cables per tower (10 active and 2 spare). Due to the rigidity of the 7/8" cable, a 1/2" heliax cable (Andrews Superflex, or equivalent) will be used to make the pigtail from the antenna end of the 7/8" cable to connection point in the tower mounted junction box. The new RF cables will be secured to the tower legs with galvanized cable guides every three feet along the tower, and with stainless steel bands (as needed) (use Andrews Wraplock, p/n 12395-1, or equivalent) where the cable transitions to antennas. No plastic tie wraps will be used outside of the building. They may be used inside the building. Cables from the base of the tower to the new junction box will be installed in previously buried PVC (3 cable runs per PVC) (para 2.1.2). Any 7/8" heliax runs that are not tied to an antenna will have 50-ohm terminating resistors at the platform and building mounted junction box ends.

2.1.1.8.2. Stainless Steel Junction Boxes.

A stainless steel junction box will be mounted at the tower platform level (for cable size transition) and on the shelter for each tower. One junction box per tower will be installed at a working height on the side of shelter at the locations shown on the sketch. Within the shelter mounted junction box, each new RF cable will be attached to a surge arrestor (Polyphaser, IS-NEMP-C2, or equivalent). Each of the 12 cables will be attached to a separate surge arrestor regardless of whether it is an active or spare cable (See attached junction box standard). Polyphasers will be mounted on a copper bus bar and the bar separately grounded to the building main ground for lightning dissipation. From the protected side of the surge arrestor, a new 1/2" heliax cable (Andrews/ LDF4-50A, or equivalent) will then be routed to the appropriate radio rack and input port in the existing radio building via the existing ceiling level trays and the overhead cable trays above the racks (see para 2.1.1.8 for info on cable trays). To provide for cable entry, the contractor shall install suitable conduit from the junction box to the shelter RF cable entry ports. All cable entry points will be covered and weather sealed as needed. The cover for the shelter penetrations can be either individual 4" PVC for each hole, or a PVC junction box that covers all the holes with PVC feeds into the stainless steel junction box below. No cables will be visible outside the stainless steel junction box.

Holes thru the building will be weather sealed. See attached sketch for a picture of a typical installation.

2.1.1.8.3. RF Cable Marking.

A metal cable tag with the cable number will be attached at both ends of the 7/8" heliax for each cable of each tower. Tags will be attached inside the appropriate junction box (one at platform level and one at building level) and secured with a suitable metal band to prevent loss of the tag. These tags allow the maintenance personnel to easily identify the ends of the cables. Since all cables within a given junction box run to a single tower, only a cable number needs to be attached.

2.1.1.9. Install Incandescent Obstruction Lights and Lightning Protection.

2.1.1.9.1. Incandescent Obstruction Lights.

A new dual lamp incandescent obstruction light (non-flashing) will be installed at the top of each tower and a galvanized conduit will then be run from the obstruction light, down the tower, and into the existing radio facility where it will be connected to the existing power distribution panel, on a 20 amp breaker reserved only for the obstruction lights. Both towers may be on the same circuit breaker. LED obstruction lights are not allowed, since they interfere with night vision goggle operation by security forces. Obstruction lights will be set to constant on operation.

2.1.1.9.2. Lightning Protection.

At the top of each tower, a new lightning rod will be installed (recommend Advance Lightning Technology/490, which includes an attached 20-ft downlead and 16-ft mast). The lightning down lead from the rod will be routed directly to the base of the new 100-ft tower using standoffs every 3 feet to support the downlead away from the tower legs, and to preclude wind motion of the down lead. A second such downlead will be installed from the lightning mast and down the opposing side of the tower as required by (TO 31-10-24). Both leads will then be cad welded or high compression crimped to the halo ground ring.

2.1.1.10. Install New Radios and Racks

Once the new shelter, tower, associated antennas, cabling, grounding, and lightning protection is in place, and tested, 5 new GRE 42 RU racks and the new GRE radios will be installed as shown on attached sketch. Overhead cable trays will be installed for signal and RF cabling that is supported across the top of the racks, or from contractor installed ceiling mounted hanger rods. The new racks will have a maximum of 5 transmit/receive channels. The new GRE radios require a total of 4 RUs per channel and will have 3 RUs of spacing between channels. Unused racks will be left as spares and space closed with metal panels designed for use by the rack selected for open positions within any rack. One rack (communications rack) will house the user interface and patch panel. The racks will be prewired for power strips, ground connections and radio signal connectors that are brought out to a punch down block to allow for user interface connections.

2.1.1.11. Install User Interface Between Shelter and Users

A contractor provided fiber optic interface and multiplexer will be installed in the comm rack shown on the attached sketch. The contractor will make all connections to the appropriate radios and racks, as well as the existing fiber optic strands. At the user end (ATC tower & RAPCON) the signals will be de-multiplexed and connected to the appropriate ETVS connection. Contractor is responsible for ensuring end to end connectivity from user to equipment shelter.

2.1.1.12. Cutover/Tune/Test All Installed Radios and Associated Equipment

Once all equipment is installed and operational in new shelter, the contractor will conduct a joint acceptance test with the local maintenance personnel, and document the results for attachment to the AFTO 747. Test will include an initial offline test of radios using local control of each radio. Once all radios are operating successfully, they will be cutover to online operations one channel at a time. The signal lines going to the existing channel in building 3502 will be disconnected and the associated signals on the new channel connected. Distant end user will then test the connection to ensure they have full audio and keyline operation. Once the radio has been deemed acceptable by ATC operations, the next channel will be transferred in

similar manner. This process will continue until all new radios in the new shelter are online and the old radios in building 3502 are offline. Upon successful testing and customer acceptance of the facility, removal actions for all old equipment may begin. Base personnel will be responsible for removal and disposal of all old radios and racks within building 3502.

2.1.1.13. Install Security Fence

Install security fence around GATR site.

2.1.1.14. Remove Old Tower

After all towers, antennas, and cabling have been installed, tested, cutover, and accepted the contractor shall remove the existing metal tower by disassembling it and preparing it for storage. The old antennas will be removed by the contractor and turned over to base personnel for their use. Contractor shall be responsible for proper disposal of all other removed items. Contractor will coordinate with base on location of storage for the removed tower and transport it to that location on base. Crane lifting plan shall be submitted for approval 14 days prior to planned lift.

2.1.1.15. Seal and Weather Proof Existing Building Penetrations from Old Cabling

After all old cables and leads are removed (para 2.1.1.11) the holes left behind in building 3502 will be sealed by the contractor by an appropriate means. The contractor will provide a specific approach for review and base approval prior to implementing this step.

2.1.1.16. Final Grounds Cleanup and Restoration.

Upon removal and disposal of all items noted in para 2.1.1.13, the grounds will be cleared of all construction debris, and contractor owned equipment. The removal site and immediate area around the construction zone will be leveled (as needed) restored to match the surrounding terrain. Areas around tower bases will be filled in to cover ground rings, and compacted against the tower foundations (if this has not already been accomplished). The following seed mix shall be applied to the disturbed areas:

Seed Name	Percentage
Microrrhizal	32
Western Yarrow	5.6
Firecracker Penstemon	2
Scarlet Globemallow	0.3
Blue Flax	21.6
Arrowleaf Balsamroot	6.8
Sandberg Bluegrass (Poa Secunda)	31.7

Seed mix shall be free of weeds. Purity greater than 90% and germination rate greater than 80%. Biodegradable erosion matting shall be placed on top of the seed.

2.1.2. Upgrade of ATC Tower & RAPCON RF Infrastructure

2.1.2.1. Install New Antennas

Four (4) new TACO dual input port antennas will be installed on the tower roof as replacements for existing antennas. Antennas will be TACO D2213 (3 each), and D2214 (1 each), or equivalent. Three (3) new TACO dual input port antennas will be installed on the RAPCON (Bldg 261) tower as replacements for existing antennas. Antennas will be TACO D2213 (3 each) or equivalent. Initially, the antennas can be installed as replacements for the existing ones and the existing cables reattached to the new antennas to preclude excessive downtime while the new cabling and junction box is prepared. Old antennas will be disposed of by

the contractor.

2.1.2.2. Install Junction Box, RF Cabling, and Surge Arrestors

2.1.2.2.1. Junction Box.

A new suitably sized fully enclosed stainless steel junction box with a weather seal on the door will be mounted at the approximate location shown on the attached tower roof sketch. Within this junction box, each new RF cable will be attached to a surge arrester (Polyphaser, IS-NEMP-C2, or equivalent) that is mounted on a solid copper bus bar. A total of 14 surge arrestors will be installed (10 active/4 spare). (See attached junction box standard). The bus bar will be connected to the tower ground line with a suitable braided copper ground lead. The ground lead will be continuous and exit the bottom of the junction box on a hole separate from the RF cables. This is the primary conductor for channeling lightning strikes to the ground. A ground test must show the connection as being 10 ohms or less. Connection to ground lead will be via cadweld or high compression crimp. Holes will be cut in the sides to allow cables to the antennas to enter/exit. Holes will be cut in the bottom of the junction to allow cables coming from the radios to enter/exit. Care must be taken to plan hole cuts in a manner that allows the holes to be weather sealed once the cables and leads have been installed. Suggest the use of a 4" PVC 90-degree elbow that can be weather sealed around the hole, and turns down to preclude water collection. This PVC can then be weather sealed once all cables are installed. See attached sketch for suggested layout.

2.1.2.2.2. RF Cables (General Info).

Recommend that RF cables be installed one radio at a time to allow only one radio to be offline. Use of the multichannel radios in the tower will also allow frequencies to be moved temporarily to another radio. Caution must be taken to coordinate work with the tower controllers to preclude working on an active antenna and potential shock. All newly installed cables will be labeled at each end with a cable number to allow maintenance personnel to clearly and easily identify both ends of the cable in question. Such cable markings will be on each end of the cables from the equipment room to the surge arrester (protected side), and from the unprotected side to antenna.

Markings inside the building may use a suitable cable marking kit. Markings on cables within the junction box and at the antenna end will use metal tags with numbers stamped on the tags to preclude weather from fading the markings.

2.1.2.2.3. RF Cables from Junction Box to Equipment Room.

Fourteen (14) new ½" heliax cables (10 active, and 4 spare) (Andrews LDF4-50A, or equivalent) will be installed from the protected side of the surge arrester in the junction box, routed out the bottom of the junction box, and then down to the equipment room via the existing RF conduit. These cables will terminate on the appropriate radio (see para 2.1.2.2.5).

2.1.2.2.4. RF Cables from Junction Box to Antennas

On the unprotected side of the surge arrestors in the junction box, a ½" heliax cable (LDF4-50A) will be fabricated, routed out the appropriate side of the junction box, and then to the appropriate port of the new antenna. Cable lengths will be planned to allow the RF cables along both directions from the junction box to be dressed and banded in a neat and professional manner. RF cables will not have coils of excess cable as part of the cable path. All antenna connections will be weather wrapped and sealed. Cables will be banded together and secured to the bottom of the tower rail using stainless steel bands (Andrews Wraplock, p/n 12395-1, or equivalent). No plastic tie wraps will be used outside of the building. They may be used inside the building. Spare surge arrestors in the junction box will have a 50-ohm terminating resistor installed on the unprotected side to terminate the cable running to the equipment room on the protected side. All cables and antennas will be swept and tested in a joint test with both the contractor and local maintenance personnel participating. Results will be recorded and attached to the AFTO form 747 upon project completion.

2.1.2.2.5. Install New Radios/Racks/Control Heads

Two new government furnished pre-wired racks and 6 new government provided radios (6 single channels and 6 multichannels) will be installed in the tower equipment room as replacements for the existing backup radios and racks. User signals from the ETVS and antenna cables installed in the preceding paragraphs will be terminated on the appropriate radio. Power for racks will reuse the existing power for the old racks. Racks will be properly grounded to the equipment room ground connection. For the multi-channel radios, 3 new remote control heads (government furnished) will be installed in the operations cab in the existing consoles. One control head assembly controls 2 multichannel radios. To allow for signals from the remote heads to be connected to the radios, a contractor provided 8-port Ethernet switch will be installed in the radio equipment rack. Contractor will be responsible for setting up the IP addresses and configuration to allow the remote control assemblies to interface with the appropriate radio. Contractor will provide training to base operations and maintenance personnel on how to configure the frequency presets for the control assembly. Old racks will be removed and disposed of by the contractor. Old radios will be turned over to base personnel for their disposal.

2.1.2.2.6. Install Obstruction Lights

Three (3) new dual lamp incandescent obstruction lights (non-flashing) will be installed at the locations shown on the attached sketch. Power connections for old obstruction lights will be reused. LED obstruction lights are not allowed, since they interfere with night vision goggle operation by security forces. Obstruction lights will be set to constant on operation. Old obstruction lights will be turned over to the base for their reuse.

2.1.2.3. Lightning Rods

Existing lightning rods will be reused. There are currently six lightning rods at the ATC Tower and two lightning rods at the RAPCON, shown on the attached sketches. Any changes to ground lead connections will be cadweld.

2.1.2.4. Cutover/ Test All Installed Antennas, Radios and Cabling

Once all the new cables, lightning protection, and antennas are in place, the contractor will conduct a joint acceptance test with the local maintenance personnel, and document the results for attachment to the AFTO 747. This includes all aspects of the installation covered under this section of the SOO.

2.1.2.5. Remove and Dispose of Old Antennas and Cabling

After all installation activities and testing are complete, the contractor will remove all old cabling, grounds leads, unused antennas, clamps, and items on the tower rails and floor that are no longer in use.

2.1.2.6. Final Grounds Cleanup and Site Restoration .

Upon removal and disposal of all items noted in para 2.1.2.6, the rooftop and equipment room work areas will be cleared of all construction debris, and contractor owned equipment by the contractor.

2.2. Government Reused Equipment (GRE) and Contractor Furnished Equipment (CFE).

This section lists all GRE, and major items that will be CFE. Unless otherwise noted, the contractor is responsible for all equipment, materials, services, rentals, and subcontracts that are required to complete this project.

2.2.1. GRE. Table below lists the GRE for this project (all items are rack mounted in old shelter):

Qty	Description	Use
30	CM-300 series radio channels (transmitter/receivers)	26 Fixed channel UHF or VHF radios 6 multichannel (CM-350 UDX/VDX)
9	Pre-wired 72" racks	Mounting of new radios noted above. (5 for shelter, and 2 for ATC tower)
3	Multichannel radios control head assemblies	Allows tower personnel to remotely tune the multichannel back up radios for their operations console.

2.2.2. CFE. Table below lists the major items of CFE for this project, however is not all inclusive. Suggested Product is for reference only. Contractor may select another manufacturer, however, it must be equivalent to the listed item:

Qty	Description	Use	Suggested Manufacturer/Part #
2	100-ft Self Supporting Tower (90 mph wind rating) TIA-222-G Standard Must include climbing safety cable and personnel harness.	Antenna Support	Antenna Products Steel Tower P/N 1500-0578-201
1	12' x 20' Precast Concrete Shelter	New radio facility	Old Castle
19	UHF, VHF antennas of varying types. Estimating 8 single and 8 dual port antennas required (4 each per tower) plus 4 dual ports for the ATC Tower roof.	Transmit and Receive Antennas (shared).	TACO D2213, D2214, or equivalent.
AR	Surge Arrestors	Lightning Protection	Polyphaser/IS-NEMP-C2
5	Incandescent Obstruction Light, Red, 120VAC, Dual Lamp, Non-Flashing	Tower and ATC Tower Marking	Dialight
1	Fiber optic channel bank system	User connectivity in shelter	Contractor selected
AR	Stainless Steel Band Kit	Secure Cables to Tower	Andrews Wraplock/12395-1 (includes 100-ft roll, with clips)
3	Stainless Steel Junction Box	Building mounted for surge arrestors and cable transition	Contractor selected
4	Stainless Steel Junction Box	Tower platform mounted for cable transition and termination and one for ATC roof	Contractor selected
2	8-port Ethernet Switch	Connects multichannel radio control heads in tower & RAPCON to the appropriate	Contractor selected
AR	7/8" Heliac Cable	Antenna to Surge Arrestor RF Cable	Andrews/ AVA5-50FX (does not include connectors)
AR	1/2" Heliac Cable	Surge Arrestor to Radio Port Cable and platform junction box to antenna port	Andrews/ LDF4-50A (does not include connectors)

AR=As Required

2.3. Base Support Requirements.

The contractor must identify in their proposal any base support requirements (for example, laydown and storage areas) necessary to complete this project. The primary point of contact for the contractor will be the 366 OSS/OSAM office located at Mountain Home AFB ID. Questions concerning equipment storage areas, shipping addresses, security requirements, location of inbriefs/outbriefs/progress meetings, marking of existing utilities, and other base support will be directed to that office. 366 OSS/OSM will then direct the contractor to the specific office that can provide the requested support. The 366 OSS/OSM must also ensure any real property updates are made upon acceptance of the equipment. They will also coordinate with base civil engineering to mark all utility and communications lines buried in the construction area around building 3502.

3. Contract Requirements:

3.1. User Selection Criteria:

3.1.1. Inbrief/Outbrief.

3.1.1.1. Inbrief.

The Contractor shall conduct an in-brief with the site POC or designated representative and other site personnel before the start of implementation. The in-brief shall familiarize the customer with the purpose of the Contractor's visit and coordinate the project schedule (e.g. arrange for required escorts; Base POC

schedule; etc.). The contractor must contact the base POCs at least one week in advance to ensure a walk-thru can be conducted and site access can be provided.

3.1.1.2. Out-brief.

The Contractor shall conduct an outbrief with the site POC or designated representative and other site personnel at the conclusion of the implementation. The implementation out-brief shall inform the customer of implementation results and necessary maintenance issues.

3.1.2. Engineering.

The Contractor shall utilize all walk-thru/site survey information to analyze the project requirement to perform engineering. The Contractor shall ensure the technical solution will integrate into the existing site-specific infrastructure (as required). The Contractor shall provide follow-on support via telephone to clarify their solution as required.

3.2. Installation:

3.2.1. Site Coordination:

The contractor shall meet with the base safety officer immediately upon arrival on site for review of the specific safety requirements prior to installation.

3.2.2. Service Outages.

The Contractor shall be responsible for preventing any unscheduled Contractor-caused interruptions of service. The Contractor shall coordinate planned outages with the site POC at least five workdays in advance of the outage if the implementation necessitates disruption of service, (e.g., communications, electrical, or other utilities).

3.3. Turn-Key Operation and Testing:

The Contractor shall engineer, furnish, install, test (EFI&T) and perform all necessary efforts to ensure successful completion of this project and make operational the equipment in all locations. The Contractor shall provide all hardware and software necessary to support this requirement. The Contractor shall submit industry standard and site specific test and acceptance procedures for Government review and approval. The contractor shall perform approved test to obtain system acceptance. The contractor shall complete all installation and testing activities within 90 calendar days of installation start date.

3.4. Hardware and Software:

The Contractor shall purchase all equipment, latest software, and accessories necessary for the execution of this project. The Contractor shall store purchased equipment in a secure/dry staging location until deployment and ship all equipment using commercial means. All hardware/software provided shall be new and include a twelve month (one-year) manufacturer warranty.

3.5. Warranty:

The contractor shall provide a warranty for the workmanship on the installation for a period of 12 months from date of site acceptance/signing of the AFTO 747 by the customer.

3.5.1. The Contractor shall provide written procedures and required information for warranty services prior to cutover in the site acceptance form or as an attachment to the site acceptance.

3.6. Configuration Management:

The Contractor shall perform configuration management of all equipment associated with the completed system. The Contractor shall provide configuration management information to the base SCX project manager. The configuration management information shall include, but not be limited to, a list of all components installed by system serial number (hardware), all passwords and if applicable software/IOS. The Contractor shall also provide schematics and wiring diagrams incorporating the new equipment and cabling into the existing configuration.

3.7. Project Management:

The Contractor shall provide a Program Manager (PM) and alternate(s) responsible for contract performance and continuity. The Contractor shall identify the Program Manager or alternate's range of authority to act for the Contractor relating to daily contract operation.

The Contractor shall provide a schedule in with the proposal. The Contractor shall plan and manage daily operations and activities associated with providing this requirement to ensure the necessary processes and activities are performed to provide an effective and acceptable system. The contractor shall employ effective management tools and methods to assure control of cost, schedule and performance. As needed, the contractor shall conduct, support, or participate in program management and technical reviews, meeting, and conferences to ensure effective and efficient project execution. The Contractor shall be responsible for storage, staging and deployment of any equipment and materials provided as part of this project unless otherwise mutually agreed upon by the Government and the Contractor.

The Government retains the right to all documentation and data generated by the Contractor as a result of this project. The Contractor shall provide COTS products with the appropriate licenses. The Government contracting officer shall have final authority for resolution of any contradictions within the proposal.

3.7.1. Site Point of Contact (POC):

The Contractor shall designate the Contractor's on-site team leader and alternate(s) as the Site POC for individual projects in their Site Visit Request Letter. The Site POC or alternate(s) shall be on site during duty hours until project completion. The Site POC shall be the interface for all work site communications with the Government, including quality, safety, and discrepancy matters.

3.7.2. General Personnel Requirements:

The Program Manager, Site POC, and respective alternate(s) shall be able to read, write, speak, and understand English. The Site Visit Request Letter shall be submitted to the Contracting Officer not later than one week prior to base visit.

3.8. Security:

3.8.1. Security Clearances:

Contractor personnel will not be working in any known classified areas. However, anyone entering Holloman AFB must be able to pass a background check. This check is performed at the entry gate for anyone not previously cleared. Anyone not passing this check at the gate will be denied entry.

3.8.2. Conditions:

Conditions caused by *Force Majeure* (acts of war, terrorism, nature, etc.) shall be addressed on an as needed bases. The contractor shall anticipate that in the event of heightened alert, access may be denied for approximately three to five days. The contractor shall also anticipate that during periods of heightened alert, time required to access may increase.

3.8.3. Key Control/Combinations.

The Contractor shall establish and implement methods of assuring control and safeguard of all Government keys or lock combinations issued to the Contractor. **GOVERNMENT KEYS SHALL NOT BE DUPLICATED.** See FAR 52.245-2(e)(2).

3.8.3.1. Notification.

The Contractor shall immediately notify the site security police and the CO of any occurrences of lost or duplicated keys or compromise of combinations.

3.8.4. Security Clearances and Background Checks, and Related Items.

Contractor will coordinate with 366 OSS/OSAM regarding need for items in this section. The primary work area does not require a security clearance.

3.8.4.1. Nominations

Nominations shall contain full identifying data on the nominee, a statement that he/she meets citizenship requirements, a description of the applicant's current clearance, and the investigative basis (National Agency Check, Background Investigation, or Single Scope Background Investigation) for the clearance.

3.8.4.2. Contractor Consent to Background Checks:

3.8.4.2.1. The Contractor and, as applicable, subcontractor shall not employ persons for work on this contract if such employee is identified as a potential threat to the health, safety, security, general wellbeing or operational mission of the installation and its population, nor shall the Contractor or subcontractor employ persons under this contract who have an outstanding criminal warrant as identified by Law Enforcement Agency Data System (LEADS) through the National Crime Information Center. LEADS checks will verify if a person is wanted by local, state, and federal agencies. All Contractor and subcontractor personnel who do not consent to a LEADS check will be denied access to the installation.

3.8.4.2.2. Information required to conduct a LEADS check includes: full name, driver's License number, and/or social security number, date of birth of the person entering the installation, and completion of a background check questionnaire. The Contractor shall provide this information, Contractors Consent for Background Check, and shall submit it in conjunction with the Contractor's request for either base or vehicle passes. Completion of a successful LEADS check does not invalidate the requirement for an escort when Contractor or subcontractor personnel are working within controlled or restricted areas.

3.8.4.2.3. Contractors shall ensure their employees and those of their subcontracts have the proper credentials allowing them to work in the United States. Persons later found to be undocumented or illegal aliens will be remanded to the proper authorities. The Contractor shall not be entitled to any compensation for delays or expenses associated with complying with the provisions of this clause. Furthermore, nothing in this clause shall excuse the Contractor from proceeding with the contract as required.

3.8.4.3. Badges:

The Contractor is required to provide identification badges with photo of employee for their employees. All Contractor personnel shall wear these badges while on duty on the government site. Badges are required to identify the individual, company name, and be clearly and distinctly marked as contractor. Size, color, style, etc. are to be mutually agreed to by the Contractor and the Government. The Contractor's identification badge will not be used as an entry requirement for installation entry or into any government designated controlled or restricted area.

3.8.4.4. Contractor Registration of Vehicles on Mountain Home AFB ID:

All Contractors or contractor employees' vehicles used for the performance of this contract shall comply with all local, state and federal regulations. Additionally any pass shall be surrendered to Security Forces upon demand to positively identify a persons need to be on a federal installation.

3.8.4.5. Access to installation during force Protection Conditions (FPCONs):

Contractors will be assigned a mission essential designation IAW requirements contained in Installation Security Instructions. Only the installation commander or the unit commander requesting contract support will assign the mission essential designation.

3.8.5. Restricted Areas:

Specific written permission to enter such areas is granted under the authority of the installation Commander or his designated representative. If work is required in a restricted area, the Contractor shall implement local base procedures for entry to Air Force controlled/restricted areas where contractor personnel will work. An AF Form 2586, Unescorted Entry Authorization Certificate, must be completed and signed by the sponsoring agency's Security Manager before a Restricted Area Badge will be issued.

3.8.6. Non-disclosure Agreements:

To safeguard information, the contractor shall enter into non-disclosure agreements with the responsible local security manager.

3.8.7. Property Protection:

The Contractor shall be responsible for safeguarding all government property, classified information, and controlled forms provided for contractor use. At the end of each work period, all government facilities, equipment, and materials shall be secured.

When not under the direct control of contractor personnel, all government facilities, equipment, and materials utilized by contractor personnel shall be secured.

3.8.8. Industrial Security:

The Contractor shall comply with all pertinent instructions, directives, and regulations, as provided by the Government, to ensure the proper implementation of the contractor's industrial security program. This includes clearance procedures, visitor's security, inspections, violations, education, classification, international, security programs and operations.

3.8.9. Listing of Employees:

The Contractor shall maintain a current listing of employees. The list shall include the employee's name, social security number and level of security clearance. The list shall be validated and signed by the Program Manager and provided to the government Security Officer and Special Security Office (SSO) within 10 days of the contract award. An updated listing shall be provided when an employee's status or information changes.

3.8.10. Accident/Incident Reporting and Investigation.

The contractor shall record and report all available facts relating to each instance of accidental damage to Government property or injury to either Contractor or Government personnel to the Base Safety Office unless otherwise stated in the SOO. The Contractor shall secure the scene of any accident and wreckage until released by the accident investigative authority through the Contracting Officer. If the Government elects to conduct an investigation of the incident, the Contractor shall cooperate fully and assist the Government personnel until the investigation is completed.

3.8.11. Subcontractor Safety.

The Contractor shall be responsible for ensuring subcontractors satisfy the safety and health requirements set forth in OSHA standards, any local procedures, and other provisions of this contract.

3.8.12. Contractor-Furnished Property And Equipment (CFP/CFE).

3.8.13. Identification / Marking.

The Contractor shall clearly mark all Contractor-Furnished Property And Equipment (CFP/CFE) with their company's name, contract/task order number, and project number. The Contractor shall place a easily read, very visible, sign (minimum 8.5" x 11") on large containers, construction equipment, or un-manned rental vehicles while on the Government installation indicating the company name; contract/task order number; project title; and both the Contractor and Site POC's names and local telephone numbers.

3.8.14. Transportation and Storage of Material/Equipment.

The Contractor shall transport and store all CFM and CFE required to perform contract requirements. It should be noted that the road to the site is unpaved and steep.

3.9. Others:

3.9.1. Documentation:

The Contractor shall provide all documents to the Government for review and approval prior to system

installation.

The Contractor shall provide the Government with all documentation compiled during the course of the project. The documentation shall be delivered by the Contractor in both hard copy and soft copy formats (on a Data CD). This documentation shall include but not limited to the following (as applicable):

- Project Management Information
- Project Planning Materials
- Services Change Orders
- Hardware Change Orders
- Out of Scope Work Hours
- Product Inventory
- Serial Numbers

3.9.2. Manuals and Practices:

The Contractor shall provide at least one paper copy and one soft copy of the latest version of operation, installation, and maintenance manuals and practices/users guide for each system installed.

3.9.3. SFS Form 30

Contractor shall provide completed SFS Form 30 for all personnel 14 days prior to start of work.

3.9.4. Commercial Deliverables and Documentation:

The Contractor shall provide standard commercial deliverables and documentation. Documentation shall be provided in Microsoft Word 2010 or PDF format unless specified otherwise below or agreed to by the Government Contracting Officer and the Contractor before installation.

3.9.5. Installation Schedules and Progress Report:

The Contractor shall prepare and deliver a schedule detailing project activity. The Contractor shall establish the project schedule/plan and submit with the technical proposal (CDRL A002). The schedule will not change after contract award.

3.9.6. Hours of Operation.

The Contractor shall routinely work during normal duty hours of the site. However, mission requirements may necessitate work outside normal hours (nights and/or weekends), especially if existing service must be interrupted. Any site work requested by the Contractor to be performed outside of normal duty hours shall be coordinated with the CO and Base POC at least three working days in advance. Loud noise generating actions will likely have to be scheduled during no or low flight operation periods. These can be coordinated with the on-site Point of Contact or shift Watch Supervisor.

3.9.7. Holidays.

The Contractor shall not perform under this contract on federal holidays or site-unique down-days unless expressly authorized by the CO and coordinated with the base POC.

3.9.8. On Call/Emergency Services.

The Contractor shall be required to provide support and/or assistance in the resolution of Contractor-caused system problems during non-duty hours for emergencies or mission need basis.

3.9.9. Integrated Product Team (IPT).

The Contractor shall chair a weekly IPT meeting that includes Contractor representatives, the Government CO, the CSI-B, the CSI-E(s), the 38 ES Project Manager, the 366 OSS Project Manager, and other base personnel as required. The Contractor shall provide an agenda and a worldwide "Meet Me" teleconference

capability for the duration of the project. The purpose of the IPT meeting is to discuss project progress, problems being encountered, and other information necessary/beneficial to ensure success and timely completion of contract requirements. The contractor shall record meeting minutes and distribute IAW (CDRL A004).

3.9.10. Weekly Status Reports.

The Contractor shall prepare a Weekly Status Report and distribute IAW (CDRL A003). The purpose of the report is to inform IPT members of project progress, problems being encountered, and other topics necessary/beneficial to ensure success and timely completion of the contract requirements.

3.9.11. Communications-Electronics Facilities Records:

The Contractor shall provide As-Built Rack Elevation Drawings and distribute IAW (CDRL A001) that include diagrams of the as-installed layout of the tower, site layout, and repeater cabinet.

3.9.12. Acceptance/Installation Test Plan:

The Contractor shall provide a test plan as to how the system will be tested to demonstrate to the Government that the system is fully operational and meets or exceeds the specified requirements and that the system is fully ready to be placed into service (CDRL A006). The Contractor shall test the system to demonstrate to the Government quality assurance evaluation of the system. These tests shall be accomplished prior to the system being placed into service.

3.9.13. Acceptance/Installation Test Report:

The Contractor shall provide an installation test report of the results of the testing accomplished under the installation test plan (CDRL A005).

3.9.14. Training Plan

Contractor shall provide User Training to the designated Site Staff in accordance with the customer requirements, as needed. Instructional sessions shall be permitted to be videotaped for future training purposes. The Government shall retain the right to duplicate and distribute the training material for future training purposes. This training will include any applicable setup, configuration, operations, and user diagnostic, repair and replacement for any installed CFE. An outline of the training plan will be discussed with the 366 OSS/OSAM POC to determine need, extent, and content of the plan (CDRL A007).

3.9.15. List of Deliverables.

All deliverables are subject to Government acceptance and approval. They shall meet professional standards and the requirements set forth in this Task Order. All deliverables shall be produced using recommended software tools/versions as accepted by the Government. The Contractor shall submit the following deliverables:

CDRL	Data Item Title
A001	As Built
A002	Work Schedule
A003	Status Report
A004	Meeting Minutes
A005	Test Report
A006	Test Plan
A007	Training Plan

3.9.16. Project Acceptance.

The Contractor shall identify and provide acceptance test criteria as a part of the contractor proposal. The Contractor shall provide a test plan after contract is awarded (CDRL A006). Upon final acceptance, the Government shall complete an AFTO 747 and provide one copy to the Contractor.

4. Point of Contacts: Info to Be Provided After Contract Award.
5. Appendix:

General Radio Installation Standards

Federal Government Standards.

NUMBER	TITLE	WEBSITE OR LOCATION
OSHA	Occupational Safety and Health Administration (OSHA)	http://www.osha.gov
EPA	Environmental Protection Agency (EPA)	http://www.epa.gov/
EPA	EPA Rules, Regulations, and Legislation	
FAA	Federal Aviation Authority (FAA)	http://www.faa.gov
FAA	FAA Regulation and Certification	http://www.faa.gov/avr/index.cfm
DODD 5220.22	DOD Industrial Security Program Directive	
DoD JTA ver. 4	Department of Defense Joint Technical Architecture	
AFI 31-101 and CAFB Supplement	The Air Force Installation Security Plan	
FAA Handbook OA P 8200.1	United States Standard Flight Inspection Manual	
FAA 6930.25A	Maintenance of Structures, Towers and Buildings	

Standard Installation Practices Technical Orders.

NUMBER	TITLE
31-10-2	Fanning and Forming Conductors for Ground C-E Equipment
31-10-6	Cable Racks, Troughs and Their Supports
31-10-7	Terminating and soldering Electrical Connections
31-10-9	Marking Site Layouts
31-10-10	Anchoring Devices for Ground C-E Equipment
31-10-11	Cross-connections and Strapping of Fixed Ground C-E Components
31-10-12	Metal Ducts and Conduits
31-10-13	Cabling for Fixed Ground C-E Equipment
31-10-24	Grounding, Bonding, and Shielding
31-10-27	Equipment Designations
31-1-141	Basic Electronics Technology
31R-10-5	Antenna Systems Maintenance, Repair, and Testing
31-10-34	Standard Installation Practices – Fiber Optic Communication Cables And Connectors

Military Standards.

NUMBER	TITLE
(ETL) 11-12	Engineering Technical Letter (ETL) 11-12: Grounding, Bonding, Testing, and Recordkeeping for Communication Facilities; dated 24 February 2011.

NUMBER	TITLE
AFI 32-1065	Grounding Bonding and Shielding for Electronic Equipment and Facilities

MIL-STD-188-124B	Grounding Bonding and Shielding
MIL-HDBK-1857	Grounding, Bonding and Shielding Design Practices
MIL-HDBK-454A	General Guidelines for Electronics Equipment

(Copies of the above documents may be obtained from the Naval Publications and Forms Center (NPFC 105), 5801 Tabor Ave, Philadelphia PA 19120.)

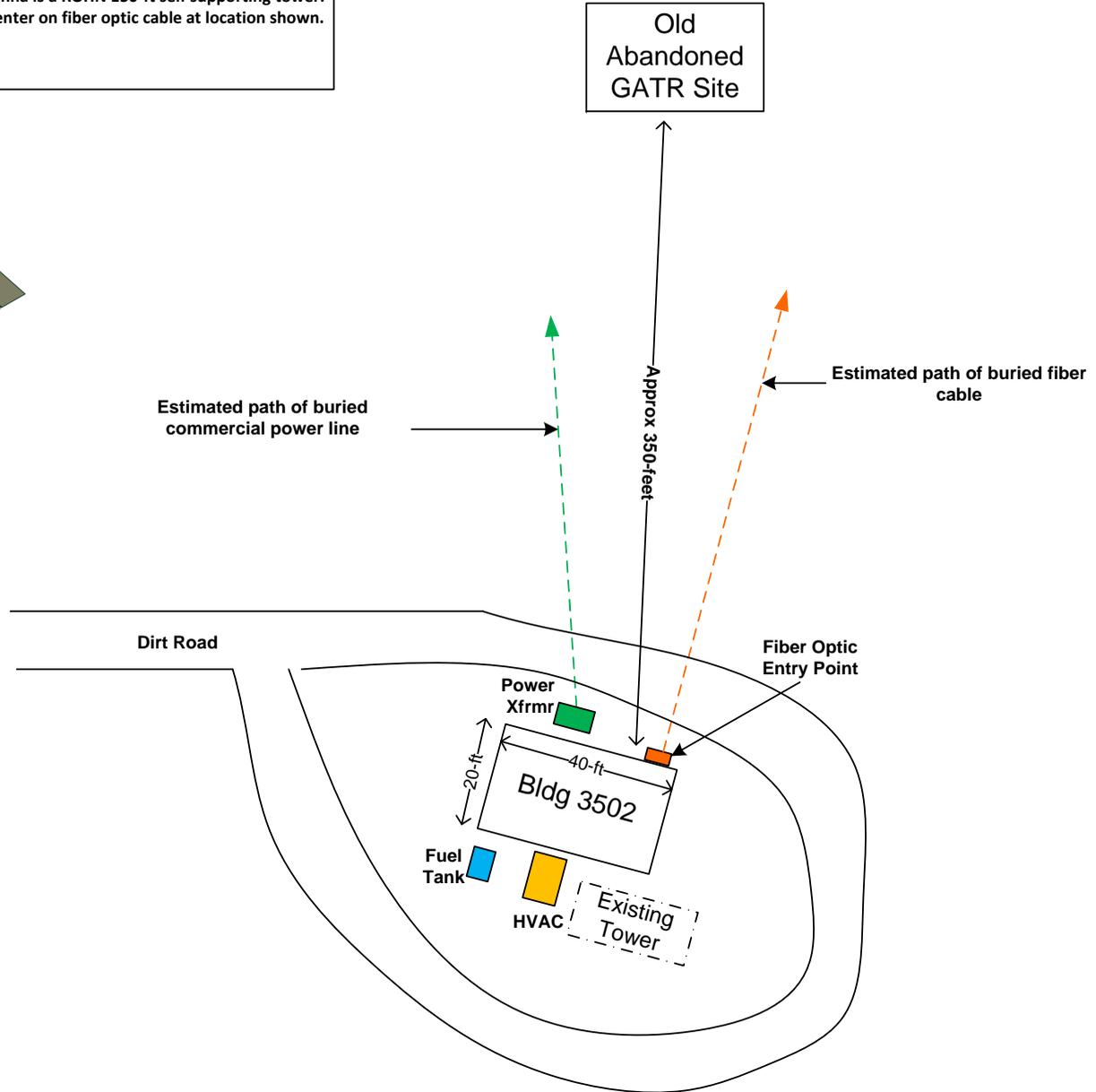
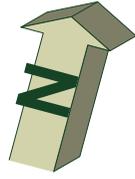
State, Local and Site-Specific Regulations.

Commercial Standards and Manuals. The Contractor shall comply with the following commercial standards where applicable. Other commercial standards may apply to individual projects and will be stated in individual task orders. It is the Contractor's responsibility to identify and obtain applicable standards proposed for the project in the Statement of Objective (SOO).

NUMBER	TITLE	WEBSITE OR LOCATION
Building Industry Consulting Service International (BICSI)	Building Industry Consulting Service International, Inc (BICSI)	http://www.bicsi.org/
NFPA 70	National Fire Protection Association (NFPA)	http://www.nfpa.org/
EIA-310	Racks, Panels and Associated Equipment	http://www.eia.org/ http://www.tiaonline.org/
NEMA TC 2	Electrical Polyvinyl Chloride (PVC) Tubing and Conduit	http://www.nema.org/stds/tc2.cfm
NEMA TC 6&8	PVC Plastic Utilities Duct for Underground Installations	http://www.nema.org/stds/tc6_8.cfm
NEMA TC 9	Fittings for PVC Plastic Utilities Duct for Underground Installation	http://www.nema.org/stds/tc9.cfm
EIA/TIA RS222-F	Tower Installation Specifications	

- 6. Attachments.
 - 6.1. Site Layout for Mountain Home AFB ID GATR Site.
Provides and existing and final layout GATR site.
 - 6.2. Site Layout for Mountain Home AFB ID ATC Tower Roof.
Provides new layout for each ATC Tower Roof.
 - 6.3. Standard for Antenna Junction Boxes for Steel Towers.
Provides a layout of the stainless steel junction box, surge arrestors, grounding, and mounting for RF cables to provide lightning protection prior to building entry.
 - 6.4. Standard for Tower Installation and Layout.
Provides a typical layout for a steel tower used for GATR site installations as a reference for the contractor.

Notes:
 1. Generator/ATS is installed in the building and will be reused. Rack mounted UPS units will also be retained.
 2. Existing antenna is a ROHN 150-ft self supporting tower.
 3. User signals enter on fiber optic cable at location shown.

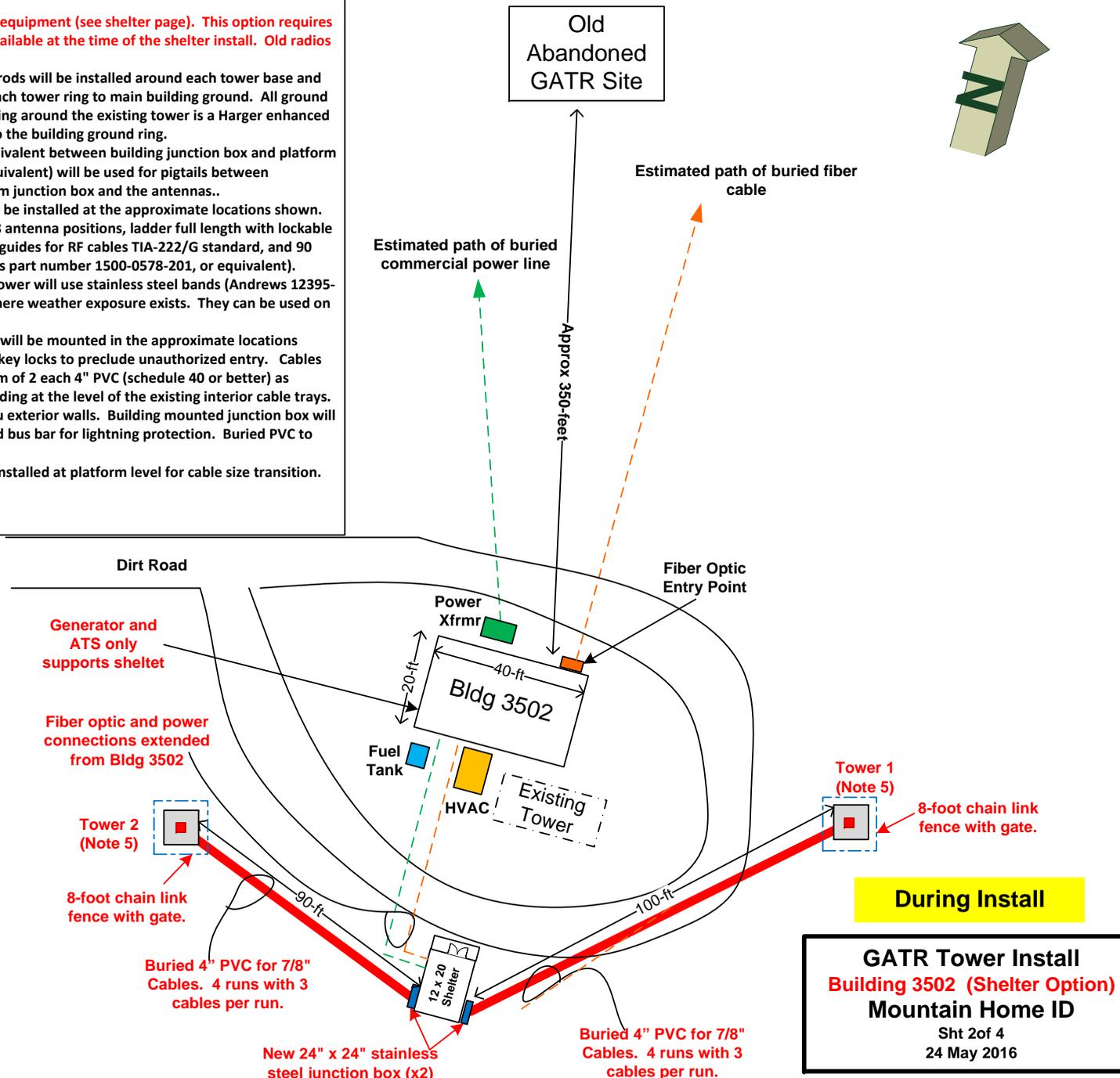


Existing

GATR Tower Install
Building 3502 (Shelter Option)
Mountain Home ID
 Sht 1 of 4
 24 May 2016

Notes:

1. New 120 VAC Incandescent obstruction lights will be installed at the top of both towers. No LED obstruction lights allowed. Power for obstruction lights will be routed thru buried conduit in the same trench as the RF cable PVC.
2. 12'x20' prefabricated shelter installed for radio equipment (see shelter page). This option requires that the new General Dynamics radios are made available at the time of the shelter install. Old radios will not be relocated to the new shelter.
3. Halo ground rings (braided copper) with ground rods will be installed around each tower base and new shelter. Ground leads will extend back from each tower ring to main building ground. All ground lead connections will be cad-welded. The ground ring around the existing tower is a Harger enhanced ground. It will not be removed and will be tied into the building ground ring.
4. RF cables will be 7/8" heliax (AVA5-50FX) or equivalent between building junction box and platform mounted junction box. 1/2' heliax (LDF4-50A, or equivalent) will be used for pigtailed between polyphaser and the radio, and between the platform junction box and the antennas..
5. Two new free 100-foot free standing towers will be installed at the approximate locations shown. Towers will have 9'x9' platforms, 4-foot side rails, 8 antenna positions, ladder full length with lockable platform hatch, safety climb equipment, and cable guides for RF cables TIA-222/G standard, and 90 mph (no ice) rating. (Recommend Antenna Products part number 1500-0578-201, or equivalent).
6. Cables requiring securing on platform or along tower will use stainless steel bands (Andrews 12395-1, or equivalent). No plastic ties will be allowed where weather exposure exists. They can be used on the interior of the building.
7. Two stainless steel junction boxes (1 per tower) will be mounted in the approximate locations shown. Boxes will be a workable height and have key locks to preclude unauthorized entry. Cables exiting the top of the junction box will use minimum of 2 each 4" PVC (schedule 40 or better) as conduit. They top of the conduit will enter the building at the level of the existing interior cable trays. Contractor will be responsible for cutting holes thru exterior walls. Building mounted junction box will contain the surge arrestors mounted on a grounded bus bar for lightning protection. Buried PVC to towers will be 4" (schedule 40 or better).
8. One smaller stainless steel junction box will be installed at platform level for cable size transition. No surge arrestors in platform level box.

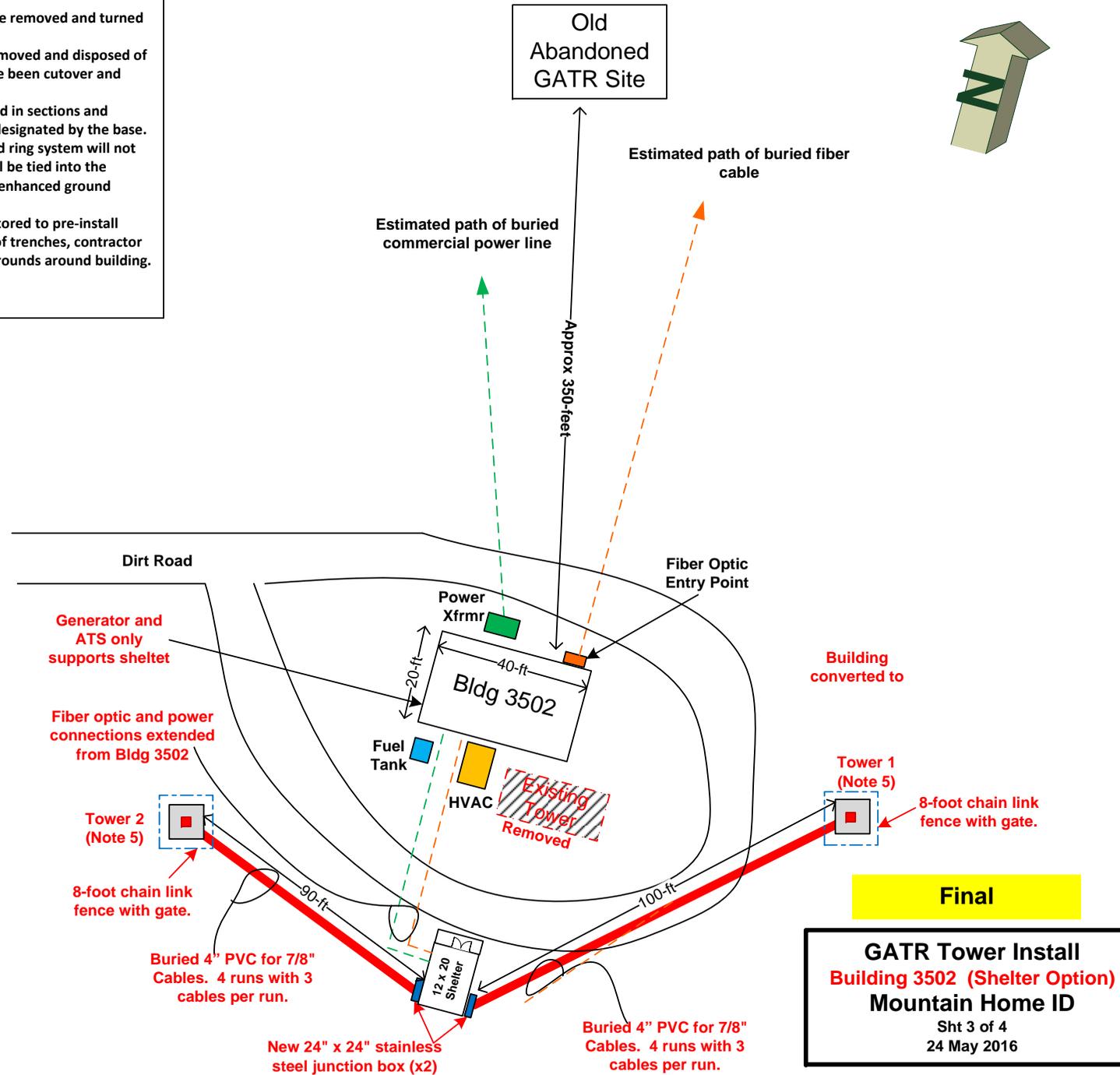


During Install

GATR Tower Install
Building 3502 (Shelter Option)
Mountain Home ID
 Sht 2of 4
 24 May 2016

Notes:

1. Antennas on existing 150-ft tower will be removed and turned over to base personnel for their reuse.
2. All RF cables on existing tower will be removed and disposed of by the contractor after the new towers have been cutover and accepted by operations.
3. Existing 150-ft tower will be disassembled in sections and transported to an onbase storage location designated by the base.
4. Tower piers and the Harger tower ground ring system will not be removed. The Harger ground system will be tied into the building 3502 ground system to provide an enhanced ground connection.
5. Ground around building 3502 will be restored to pre-install condition. Includes filling and compacting of trenches, contractor generated debris removal, and grading of grounds around building.

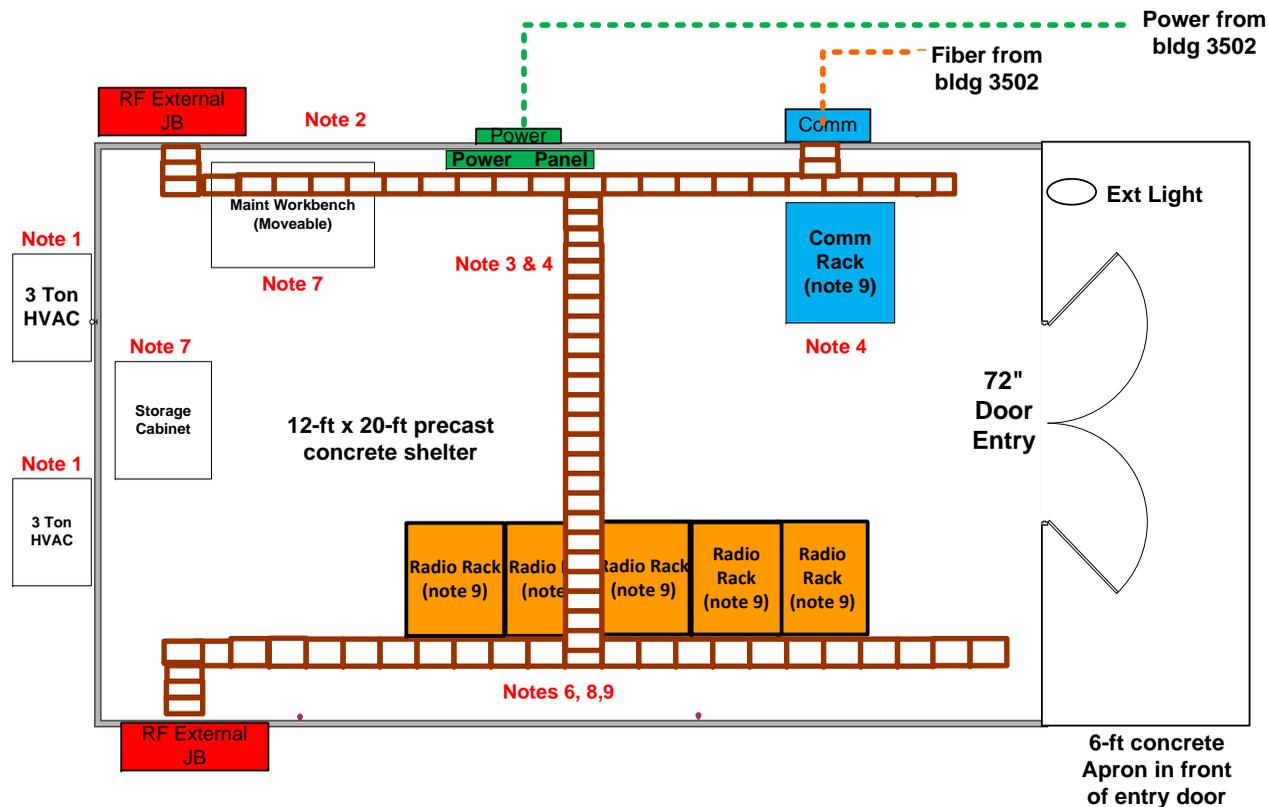


Final

GATR Tower Install
Building 3502 (Shelter Option)
Mountain Home ID
Sht 3 of 4
24 May 2016

Notes:

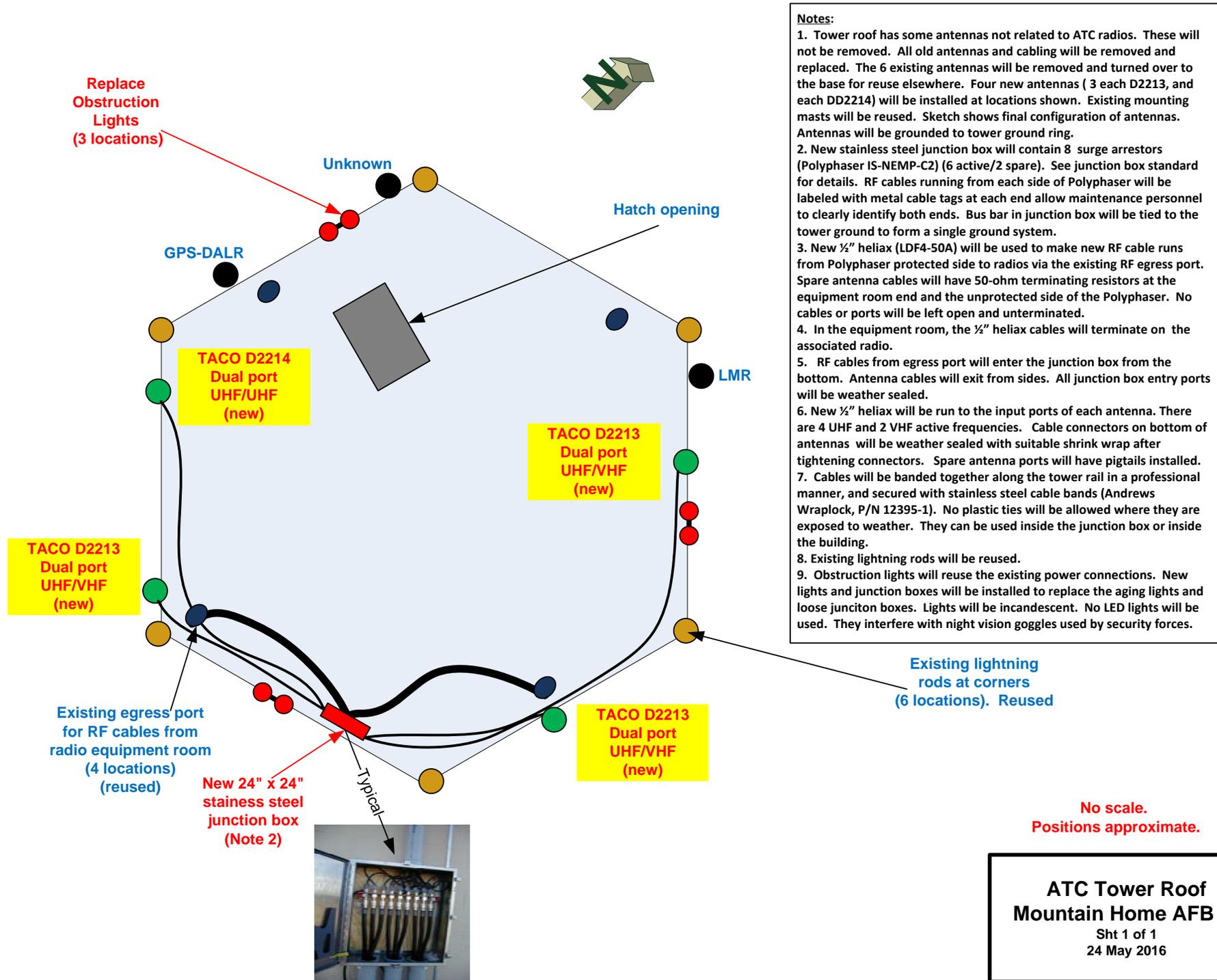
1. HVAC capacity is shown for illustration. Contractor shall determine appropriate capacity for expected heat load.
2. Generator and ATS will be located in existing building 3502 and extended to new shelter. Rack UPS will be installed for each rack. Existing rack UPS in building 3502 will be reused. Contractor will be responsible for extending and burying the power line from building 3502.
- 3 A fire transmitter will be installed IAW with base fire department requirements and tested with participation from base fire personnel.
4. Comm rack will be contractor provided and populated with a new fiber mux, media converters, and line cards for each radio. Contractor will be responsible for extending and burying the fiber connection from building 3502.
5. HVAC will not be on an UPS. Generator must come online within 5 minutes to restore power to the entire shelter.
6. Distance from racks to back wall must be at least 36-inches to provide for OSHA required egress space.
7. Cabinet and bench are for illustration only. These will be determined and purchased by base after project acceptance.
8. Radio and radio racks are government provided. Comm rack will be contractor provided.
9. Contractor will be responsible for installing, testing, and cutting over new government provided radios to operations.
10. Shelter will be mounted on a suitable reinforced concrete pad with additional tie-downs to achieve a minimum 100-mph wind load rating. Pad will extend above the ground level to provide a 6-inch reveal.



**SHELTER
DETAILS**

GATR Tower Install
Building 3502 (Shelter Option)
Mountain Home ID

Sht 4 of 4
24 May 2016



- Notes:**
1. Tower roof has some antennas not related to ATC radios. These will not be removed. All old antennas and cabling will be removed and replaced. The 6 existing antennas will be removed and turned over to the base for reuse elsewhere. Four new antennas (3 each D2213, and each DD2214) will be installed at locations shown. Existing mounting masts will be reused. Sketch shows final configuration of antennas. Antennas will be grounded to tower ground ring.
 2. New stainless steel junction box will contain 8 surge arrestors (Polyphaser IS-NEMP-C2) (6 active/2 spare). See junction box standard for details. RF cables running from each side of Polyphaser will be labeled with metal cable tags at each end allow maintenance personnel to clearly identify both ends. Bus bar in junction box will be tied to the tower ground to form a single ground system.
 3. New 1/2" heliax (LDF4-50A) will be used to make new RF cable runs from Polyphaser protected side to radios via the existing RF egress port. Spare antenna cables will have 50-ohm terminating resistors at the equipment room end and the unprotected side of the Polyphaser. No cables or ports will be left open and unterminated.
 4. In the equipment room, the 1/2" heliax cables will terminate on the associated radio.
 5. RF cables from egress port will enter the junction box from the bottom. Antenna cables will exit from sides. All junction box entry ports will be weather sealed.
 6. New 1/2" heliax will be run to the input ports of each antenna. There are 4 UHF and 2 VHF active frequencies. Cable connectors on bottom of antennas will be weather sealed with suitable shrink wrap after tightening connectors. Spare antenna ports will have pigtailed installed.
 7. Cables will be banded together along the tower rail in a professional manner, and secured with stainless steel cable bands (Andrews Wraplock, P/N 12395-1). No plastic ties will be allowed where they are exposed to weather. They can be used inside the junction box or inside the building.
 8. Existing lightning rods will be reused.
 9. Obstruction lights will reuse the existing power connections. New lights and junction boxes will be installed to replace the aging lights and loose junction boxes. Lights will be incandescent. No LED lights will be used. They interfere with night vision goggles used by security forces.

No scale.
Positions approximate.

ATC Tower Roof
Mountain Home AFB ID
 Sht 1 of 1
 24 May 2016

Obstruction light (not shown) as needed.

Lightning rod assemblies (one each on opposite sides). Elevated to allow for 45 degree protection of antennas. Braided copper downloads from rod base to halo ground. Ground lead attached every 2-3 feet on standoffs.

Stainless Steel Junction Box mounted at Tower Platform level for cable size transition

4-foot platform with 8 antenna positions.

Locking hatch at platform level above ladder.

Safe-T-Climb system with personnel harness

Free standing tower (nominally 20-100-ft from base to platform). TIA-222/G windload profile.

Low loss RF cables from platform junction box to underground PVC. See page 2 of this standard for cable and connector details. Use stainless steel cable guides or Andrews Wraplock for securing cables along path.

Halo ground ring around base. 10-ohms or less ground resistance. All connections cadwelded

Embedment base foundation w/ PVC for underground routing of RF cables. (See detail below)



ATC Radio Tower Standard
Typical Tower Configuration

Sht 1/2
22 Jul 2015

Stainless Steel Junction Box mounted at Tower Platform level for cable size transition

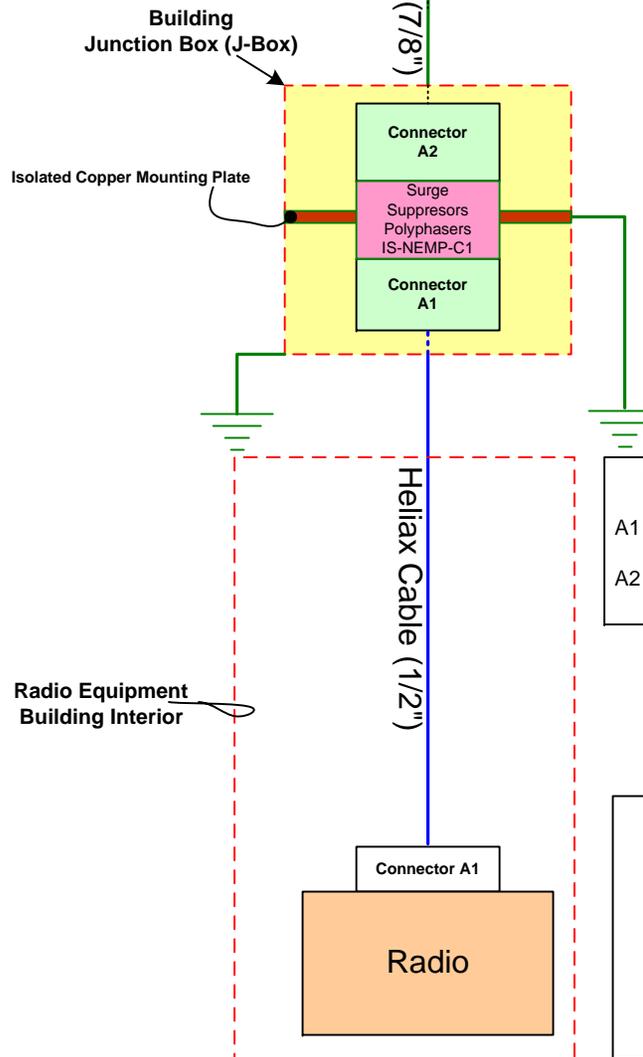
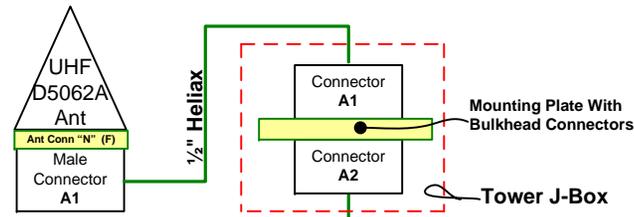


Stainless Steel Junction Box mounted on GATR building for cable size transition and lightning Protection.



Mounted at a working height for maintenance personnel.

One junction box per tower. All cables labeled to match tower platform junction box cable ends.



Cable Information (Andrews)
 1/2-Inch Heliac... PN LDF4-50A
 7/8-Inch Heliac... PN AVA5-50FX

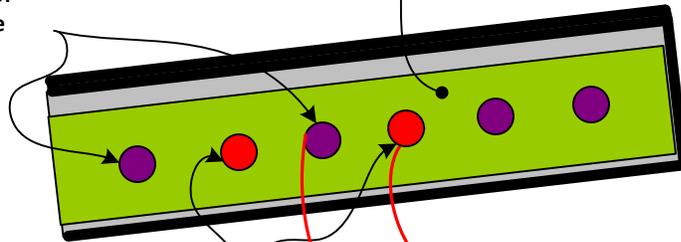
Cable Connector Info (Or Equal Connector)
 A1 = Coimmscope L4PNM-RC For 1/2" Heliac Cable
 A2 = CommScope 78EZNM For 7/8" Heliac

**ATC Radio Tower Standard
 Typical ANTENNA-CABLE-
 CONNECTOR Configuration**
 Sht 2/2
 22 Jul 2015

New 5/8" OR 7/8" Heliax Cables To J-Box On Tower Platforms or to Antennas on Poles. Use 1/2" heliax For Pigtail Cable Between Antennas And J-Box on Tower Platforms.

Existing Or New Bulkhead Plate (As Required)

Existing Bulkhead Connectors Or Openings In The Bulkhead Plate



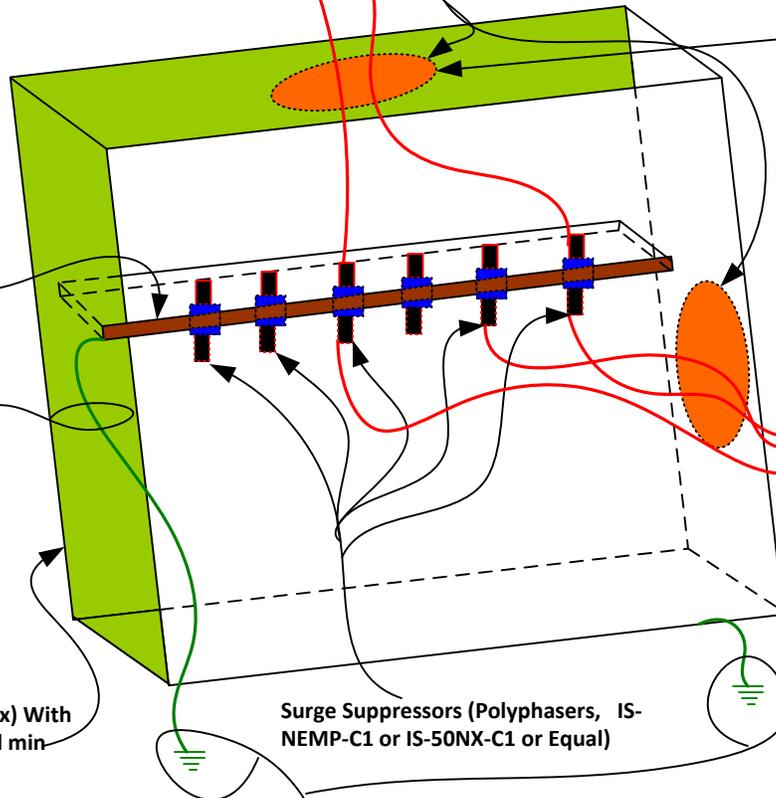
Cut Opening(s), As Required, In Existing Bulkhead Plate So New Cables Can Be Run To Radios. After The New Cables Have Been Pulled, Tested, etc., And The Old Cables Have Been Removed, All Openings Are To Be Sealed Weather Tight Prior To Installation Of Hood. Cables Between J-Box And Bulkhead Plate Need To Be Contained In Weather Tight Enclosure.

1/2" heliax or Other RF Cable To Radios

Cut Appropriate Size Openings And Seal Weather Tight Rubber Gromets (or Equal) Around Openings. Openings Could Be On Sides, Top/Bottom Depending On The Site.

For openings cut in the top, an appropriate length of Schedule 40 PVC (typically 4" diameter) will be installed between the hole and the entry into the building to include any necessary elbows. The ends of the PVC will be weather sealed to prevent water entry into the junction box of building.

Isolated Copper Plate. Drill Proper Size Holes And Mount Surge Suppressors. **NOTE: Place Stainless Steel Washer/spacer Between Aluminum Shell Of Surge Suppressors & Copper Buss. This Is To Prevent Possible Corrosion Between Dissimilar Materials.**



Ground Lead Off The Copper Buss Is To Be Isolated To Prevent Contact With The J-Box.

Stainless Steel Junction Box (J-Box) With Door (Weather Tight). Suggested min-size of 36"X32"X8".

Surge Suppressors (Polyphasers, IS-NEMP-C1 or IS-50NX-C1 or Equal)

Take To Site Systems Ground Via Separate Path And Bond By Exothermic Weld

STANDARD 38 EIG SKETCH
 Typical-Configuration, Mounting, and Grounding Of Building Junction Box (J-Box)
38 EIG STD SKT-JBOX-001

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Example final layout of typical junction box. This is for illustrative purposes only, and specific site installs may differ as noted on page one of this sketch.

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