

ATTACHMENT E
PRICING INSTRUCTION FORM AND
EXAMPLES OF TASK ORDER 1 THRU 5

Instructions

In order to assist vendors in the preparation of their price proposal and to comply with the requirements of this solicitation, Price Instructions and Price Forms have been prepared. Vendors must submit their price proposal on the forms in accordance with the instructions on the forms and as specified herein. Do not alter the forms or the price proposal shall be rejected. The Price Form is to be signed and dated, where requested, by an individual who is authorized to bind the firm to all prices offered.

The State reserves the right, at its sole discretion, not to purchase any equipment or service for which are solicited under this RFP.

Vendors are required to record the prices they are proposing for each listed item, and compute the total. The price forms are used to calculate the vendor's TOTAL PRICE.

- A) All Unit/Extended Prices must be clearly typed or written in ink with dollars and cents, e.g., \$24.15 and all percentages must be typed or written in ink with no more than one decimal place, e.g., 15.5 %.
- B) All Unit Prices must be the actual unit price the State shall pay for the proposed item per this RFP and may not be contingent on any other factor or condition in any manner. All percentages must be the actual percentage reduction that shall be applied to the manufacturer's price lists supplied.
- C) All calculations that result in a fraction of a cent must be rounded to the nearest whole cent, i.e., \$1.025 would be rounded to \$1.03 and \$1.024 would be rounded to \$1.02.
- D) All goods or services required or requested by the State and proposed by the vendor at No Cost to the State must be clearly entered in the Unit Price and Extended Price with \$0.00.
- E) All goods or services required or requested by the State and Not Offered by the vendor to the State must be clearly typed in the Unit Price and Extended Price with N/O.
- F) Except as instructed on the forms, nothing shall be entered on the forms that alters or proposes conditions or contingencies on the prices or percentages.

Vendors must record the required information on each table as follows:

Specifications of equipment and/or services requested. Record the price per project line item in the price Column. Record the total of all the line item prices on the appropriate line, Total Price.

On Attachment E-1 - Summary Price Form - Record the total of each of the five (5) Examples of Task Orders in Column B. Record total price for all five (5) Examples of Work under C.

Example of Task Order # 1

Tower – Self Supporting 180-ft AGL 12 X 38 X 10-FT Equipment Shelter

SCOPE OF SERVICES AND SPECIFICATIONS

The Contractor shall purchase and provide all coordination, functions, labor, materials, insurance and items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

A. Site Preparation Work

1. Clearing and grading of one (1) approximately 100 ft x 100 ft area to install one (1) 12 ft. x 38 ft. concrete equipment shelter foundation, one (1) tower foundation for a 180-ft self-supporting tower, and one (1) 1,000 gallon liquid propane fuel tank foundation.
2. Purchase and installation of a 180-ft self-supporting tower foundation.
3. Purchase and install one (1) 4 ft. x 20 ft. foundation for a 1,000 gallon LP propane fuel tank.
4. Purchase and installation of one (1) 12 ft. x 38 ft. equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one (1) concrete foundation with integrated continuous stoops for the doors, designed to support one (1) 12x38x10 ft. concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
5. Upon completion of tower installation, the Contractor shall re-grade and install storm-water management, grub the entire site, extending 2 –feet below finished grade, and two (2) ft. around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
6. The Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The Contractor shall provide and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 ft. long by 60 ft. wide. The security gate shall be chained and padlocked and

the State Project Manager shall have the master key and shall control access to the site.

8. The Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
9. The Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Tower Specifications

1. The tower shall be a solid steel leg constructed, self-supporting, 180 ft. lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager (See Section 1.3).
2. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The State Project Manager shall coordinate exact placement of the tower and shelter with the Contractor.
4. The tower shall be required to meet or **exceed** the latest EIA 222-F standards for this type of tower with the State supplied loading design and a **wind loading of 80 M.P.H. concurrent with ½- inch of radial ice.** The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. The bottom 20 ft. (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 ft. (minimum) of the tower shall contain no slope.
6. Spacing between tower legs shall not exceed 26 ft.
7. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.

8. The Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The Contractor shall furnish one (1) copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one (1) copy to Maryland State Department of Budget & Management with the response to the Task Order. The Contractor shall furnish a statement that the engineered tower foundations and the calculated ground loadings meet the manufacturer's recommended requirements.
9. Step bolts and safety climbs are to be provided as part of the tower.
10. All leg and leg flange PL material is ASTM A-572 grade 50 ($F_y \geq 50$ ksi). All other material is ASTM A36 ($F_y \geq 36$ ksi)
11. 1 1/8" Φ ASTM A449 anchor bolts required per leg.
12. Concrete strengths to equal 3000 PSI at 28 days.
13. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
14. Water reducing admixture may be utilized in compliance with ASTM-C-494.
15. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
16. Minimum concrete cover of 3 inches on all steel.
17. Crown top of piers for drainage and chamfer all exposed concrete edges 1 inch.
18. Compact backfill in 9 inch lifts. Remove all forms prior to backfill.

C. Specifications for Shelter Equipped with Emergency Power

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece Concrete Communications Equipment Shelter including a 35KW generator, 200 Amp Service Panel, and ATS. The supplied equipment shelter shall be nominally sized 12 ft. x 38 ft. x 10 ft. (Height is inside dimension) and configured with two rooms.
3. Two (2) cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the

equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four (4) inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four (4) rows of four (4) ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual location of these penetrations and sleeves must be confirmed with the Project Manager prior to the fabrication of the shelter.

4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. All shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.

10. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot
The minimum roof loading design will be 100 lbs. per square foot
The minimum wall loading design will be 34 lbs. per square foot
The minimum wind loading design will be 50 lbs. per square foot
12. Two reinforced steel finished doors shall be located on each shelter, per the attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately 3 foot by 7 foot, and in a metal frame. The door will be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three (3) point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 ft. high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x 4 ft. X 8 ft. plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five (5) ft. intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six (6) feet from boxes mounted at 22” intervals on the ceiling. Wiring for these drops shall be housed in “Sealtite” flexible conduit and each drop shall be terminated in a quad receptacle box.

Each circuit drop shall have its own dedicated twenty (20) ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.

16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 200amp 20-position (minimum) load center, equipped with a minimum of twenty (20) 20-amp breakers. Breakers shall be “high magnetic” or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five (5) feet of the primary cable entry port. The shelter will be provided with a -200-Amp load center.
18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo’s 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch (2”) standoff insulators, connected to one (1) ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two (2) 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.
19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An

exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.

21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a “66 Block”:
 - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
 - ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
 - ◆ Generator Alarm – Output when generator is running.
 - ◆ Entry/Intrusion – Output when either door is opened
 - ◆ Fire and Smoke Alarm
22. This double room shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one (1) hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.
23. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.
24. The Contractor shall supply with each equipment shelter one (1) 35 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 44 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).
25. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.
26. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines

needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two (2) 12 VDC battery chargers is not acceptable on 24-volt systems.

27. The contractor must perform on-site startup of the generator under full load.
28. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a "66 block".
29. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
30. An external 1/4-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, 2-inch ground straps, to the single ground point directly below the main cable entry port.
31. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed 2 feet outside the shelter footprint in order to be outside the drip line of the shelter.
32. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event 5 Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one (1) fully functional, 180 ft. above ground level, three (3) legged, heavy duty, self-supporting, two-way microwave radio tower.
2. Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified

signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-ins), and supplying and installing two (2) nominal 24 inches wide by 20 ft. long extruded metal, 4 post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.

4. The tower shall be erected to a height of 180 ft. (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 ft. (minimum) of the 180 ft. tower shall contain no slope.
5. The following lightning protection devices shall be installed:
 - ◆ An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
 - ◆ An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
6. Purchase and installation of one (1) 12 x 38 x 10 ft. concrete equipment shelter (height is inside dimension) with a 35 KW standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within 1/2 degrees.
7. Purchase and installation of one (1) new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.
8. Provision and installation of a liquid cooled, 1800 RPM, 44 KVA, 60 hertz, 35 KW liquid propane vapor fueled generator complete with a 200-Amp automatic transfer switch capable of zero cross-over switching to eliminate service interruptions.
9. Generator start-up and test under load after permanent power is connected to the equipment shelter.
10. Purchase and install one (1) nominal 20 ft., 24-inch wide, 4-post, no cantilever ice bridge.
11. Purchase and installation of site grounding in accordance with Motorola R-56 standards.
12. Purchase and installation of three (3) 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation

point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one (1) electric company meter face.

**PRICE SHEET
EXAMPLE OF TASK ORDER #1
180-FT SELF SUPPORTING TOWER
AND
12X38X10-FT SHELTER**

PROJECT LINE ITEM

PRICE

A: SITE PREPARATION

1. Clearing and grading of one (1) 100 ft x 100 ft area

2. Purchase and installation of one (1) tower foundation

3. Purchase and installation of one (1) 4 ft x 20 ft concrete foundation to install one (1) 1,000 gallon liquid propane fuel tank

4. Purchase and installation of one (1) 12 ft x 38 ft concrete foundation to install one (1) 12x38x10-ft concrete equipment shelter

5. Site restoration, grading, grubbing, reseeding, installation of storm water management.

6. Purchase and installation of temporary storm-water management and soil erosion measures during construction

B: INSTALLATION

<p>7. Purchase, shipping and erection of one (1) fully functional, 180-ft self supporting tower</p>	
<p>8. Purchase, shipping and installation of one (1) 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 35KW standby generator</p>	
<p>9. Purchase and installation of one (1) new 1,000 gallon liquid propane fuel tank including first fuel fill-up</p>	
<p>10. Generator start up test under full load</p>	
<p>11. Purchase and installation of one (1) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.</p>	
<p>12. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel</p>	
<p>13. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch</p>	
<p>14. Purchase and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 ft. long by 100 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	

<p>15. Purchase and install grounding associated with the equipment shelter and fuel tank and connect to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O)</p>	
<p>16. Purchase and installation of three (3) – 4inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point to a Contractor supplied backboard and from the backboard into the equipment shelter, and purchase and installation of one (1) electric company meter face.</p>	
<p>TOTAL PRICE TASK ORDER #1 (ITEM 1 THROUGH 16 ADDED)</p>	

Example of Task Order # 2

Tower - Self Supporting 330-ft AGL 12 X 38 X 10-FT Equipment Shelter

SCOPE OF SERVICES AND SPECIFICATIONS

The Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

A. Site Preparation Work

Clearing and grading of approximately one (1) 100 ft. x 100ft. area

1. Purchase and installation of the tower foundation.
2. Purchase and installation of one (1) 12 ft. x 38 ft. equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one (1) concrete foundation with integrated continuous stoops for the doors, designed to support one (1) 12x38x10 ft. concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
3. Purchase and install one (1) foundation for a 1,000 gallon LP propane fuel tank.
4. Upon completion of tower installation, the Contractor shall re-grade and install storm-water management, grub the entire site extending two (2) ft. below finished grade and two (2) ft. around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
5. The Contractor shall provide and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 ft. long by 100 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.
6. If necessary, the Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.

8. The Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Tower Specifications

9. The tower shall be a solid steel leg constructed, self-supporting, 330 ft. lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager
10. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
11. The Contractor with the State Project Manager shall coordinate exact placement of the tower and shelter.
12. The tower shall be required to meet or **exceed** the latest EIA 222-F standards for this type of tower with the State supplied loading design and **a wind loading of 80 M.P.H. concurrent with ½- inch of radial ice.** The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The Contractor shall supply and install an FAA - A1 tower lighting system in accordance with FAA regulations. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
13. The bottom 20 ft. (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 ft. (minimum) of the tower shall contain no slope.
14. Spacing between tower legs shall not exceed 32 ft.
15. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
16. The Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The Contractor shall furnish one (1) copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one (1) copy to Maryland State Department of Budget & Management . The Contractor shall furnish a statement that the engineered tower

foundations and the calculated ground loadings meet the manufacturer's recommended requirements.

17. Step bolts and safety climbs are to be provided as part of the tower.
18. All leg and leg flange PL material is ASTM A-572 grade 50 ($F_y \geq 50$ ksi). All other material is ASTM A36 ($F_y \geq 36$ ksi)
19. 1 1/8" Φ ASTM A449 anchor bolts required per leg.
20. Concrete strengths to equal 3000 PSI at 28 days.
21. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
22. Water reducing admixture may be utilized in compliance with ASTM-C-494.
23. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
24. Minimum concrete cover of 3 inches on all steel.
25. Crown top of piers for drainage and chamfer all exposed concrete edges 1 inch.
26. Compact backfill in 9 inch lifts. Remove all forms prior to backfill.

C. Specifications for Shelter Equipped with Emergency Power

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece Concrete Communications Equipment Shelter including a 75KW generator, 400 Amp. Service Panel, ATS with installation, included. The supplied equipment shelter shall be nominally sized 12 ft. x 38 ft. x 10 ft. (Height is inside dimension) and configured as a two-room shelter.
3. Two (2) cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four (4) inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four (4) rows of four (4) ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual

location of these penetrations and sleeves must be confirmed with the Project Manager prior to the fabrication of the shelter.

4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. All shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
7. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot
The minimum roof loading design will be 100 lbs. per square foot

The minimum wall loading design will be 34 lbs. per square foot
The minimum wind loading design will be 50 lbs. per square foot

12. Two reinforced steel finished doors shall be located on each shelter, per the attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately 3 foot by 7 foot, and in a metal frame. The door shall be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three (3) point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 ft. high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over 1/2 inch plywood. There will be a telephone mounting board of 3/4 inch x 4 ft. X 8 ft. plywood installed at one end of the equipment shelter that is painted to match the walls.
15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five (5) ft. intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six (6) feet from boxes mounted at 22" intervals on the ceiling. Wiring for these drops shall be housed in "Sealtite" flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own dedicated twenty (20) ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.
16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 400-amp, 20-position (minimum) load center, equipped with a minimum of twenty (20) 20-amp breakers. Breakers shall be "high magnetic" or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five (5) feet of the primary cable entry port. The shelter will be provided with a 400-Amp load center and a 200-Amp sub feed panel shall be installed adjacent to, and fed from, the main service panel to provide electrical

feed to a second shelter that will be installed in the future.

18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo's 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch (2") standoff insulators, connected to one (1) ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two (2) 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.
19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.
21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a "66 Block":
 - ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
 - ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
 - ◆ Generator Alarm – Output when generator is running.
 - ◆ Entry/Intrusion – Output when either door is opened

◆ Fire and Smoke Alarm

22. This double room shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one (1) hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.
23. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.
24. The Contractor shall supply with each equipment shelter one (1) 75 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 94 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).
25. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.
26. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two (2) 12 VDC battery chargers is not acceptable on 24-volt systems.
27. The contractor must perform on-site startup of the generator under full load.
28. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a "66 block".
29. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
30. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with

two, solid tinned copper, 2-inch ground straps, to the single ground point directly below the main cable entry port.

31. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed 2 feet outside the shelter footprint in order to be outside the drip line of the shelter.
32. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event 5 Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one (1) fully functional, 330 ft. above ground level, three (3) legged, heavy duty, self-supporting, two-way microwave radio tower.
2. Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-ins), and supplying and installing two (2) nominal 24 inches wide by 20 ft. long extruded metal, 4 post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.
4. The tower shall be erected to a height of 330 ft. (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 ft. (minimum) of the 330 ft. tower shall contain no slope.
5. The Contractor shall purchase and install one (1) FAA A-1 medium intensity, dual tower lighting system.
6. The Contractor shall install the following lightning protection:

- a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
 - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
7. Purchase and installation of one (1) 12 x 38 x 10 ft. concrete equipment shelter (height is inside dimension) with a 75 KW standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within ½ degrees.
8. Purchase and installation of one (1) new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.
9. Provision and installation of a liquid cooled, 1800 RPM, 94 kVA, 60 hertz, 75 KW liquid propane vapor fueled generator complete with a 400-Amp automatic transfer switch capable of zero cross-over switching to eliminate service interruptions.
10. Generator start-up and test under load after permanent power is connected to the equipment shelter.
11. Purchase and install one (1) nominal 20 ft., 24-inch wide, 4-post, no cantilever ice bridge.
12. Purchase and installation of three (3) 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one (1) electric company meter face.

**PRICE SHEET
 EXAMPLE OF TASK ORDER # 2
 330-FT SELF SUPPORTING TOWER
 AND
 12X38X10-FT SHELTER**

PROJECT LINE ITEM	PRICE
A: SITE PREPARATION	
1. Clearing and grading of one (1) 100 ft x 100 ft area	
2. Purchase and installation of one (1) tower foundation for a 330-ft self supporting tower	
3. Purchase and installation of one (1) 4 ft x 20 ft concrete foundation to install one (1) 1,000 gallon liquid propane fuel tank	
4. Purchase and installation of one (1) 12 ft x 38 ft concrete foundation to install one (1) 12x38x10-ft concrete equipment shelter	
5. Site restoration, grading, grubbing, reseeding, installation of storm water management.	
6. Purchase and installation of temporary storm-water management and soil erosion measures during construction	

B: INSTALLATION

7. Purchase, shipping and erection of one (1) fully functional, 330-ft self supporting tower

8. Purchase and installation of one (1) FAA - A1 tower lighting system in accordance with FAA regulations.

9. Purchase, shipping and installation of one (1) 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 75KW standby generator

10. Purchase and installation of one (1) new 1,000 gallon liquid propane fuel tank including first fuel fill-up

11. Generator start up test under full load

12. Purchase and installation of one (1) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.

13. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel

14. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch

<p>15. Purchase and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 ft. long by 100 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	
<p>16 Purchase and installation of 3 – 4inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one (1) electric company meter face.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>TOTAL PRICE TASK ORDER #2 (ITEM 1 THROUGH 16 ADDED)</p> </div>	

Tower – Self Supporting 450-ft AGL,
One (1) 12 X 38 X 10-FT Two-Room and One (1) 12 X 38 X 10-ft One-Room
Equipment shelter

SCOPE OF SERVICES AND SPECIFICATIONS

The Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

A. Site Preparation Work

1. Clearing and grading of one area approximately 100 ft. x 100 ft.
2. Purchase and installation of the tower foundation.
3. Purchase and installation of two (2) 12 ft. x 38 ft. equipment shelter foundations as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelters and foundations shall include: the construction of two (2) concrete foundations with integrated continuous stoops for the door(s), designed to support two (2) 12x38x10 ft. concrete equipment shelters (height is inside dimension). The equipment shelter foundations shall be installed at the same time as the tower foundation.
4. Purchase and install one (1) 4 ft. x 20 ft. foundation for a 1,000 gallon LP propane fuel tank.
5. Upon completion of tower installation, the Contractor shall re-grade and install storm-water management, grub the entire site extending two (2) ft. below the finished grade and two (2) ft. around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
6. The Contractor shall provide and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 ft. long by 100 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.
7. The Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
8. The Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.

9. The Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Tower Specifications

1. The tower shall be a solid steel leg constructed, self-supporting, 450 ft. lattice tower. The tower shall be constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager (See Section 1.3).
2. Supplied materials, including, but not limited to, equipment shelter, fuel tank and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The Contractor with the State Project Manager shall coordinate exact placement of the tower and shelter.
4. The tower shall be required to meet or **exceed** the latest EIA 222-F standards for this type of tower with the State supplied loading design and a **wind loading of 80 M.P.H. concurrent with ½- inch of radial ice.** The tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The Contractor shall supply and install a Medium Intensity, dual mode (day/night) tower lighting system in accordance with FAA regulations. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. The bottom 20 ft. (minimum) of the tower shall have K-bracing construction to allow for ingress and egress under the tower. The top 60 ft. (minimum) of the tower shall contain no slope.
6. Spacing between tower legs shall not exceed 38 ft.
7. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
8. The Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The Contractor shall furnish one (1) copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one (1)

copy to Maryland State Department of Budget & Management at the address identified in paragraph 33.2 of the contract, attachment A. The Contractor shall furnish a statement that the engineered tower foundations and the calculated ground loadings meet the manufacturer's recommended requirements.

9. Step bolts and safety climbs are to be provided as part of the tower.
10. All leg and leg flange PL material is ASTM A-572 grade 50 ($F_y \geq 50$ ksi). All other material is ASTM A36 ($F_y \geq 36$ ksi)
11. 1 1/8" Φ ASTM A449 anchor bolts required per leg.
12. Concrete strengths to equal 3000 PSI at 28 days.
13. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.
14. Water reducing admixture may be utilized in compliance with ASTM-C-494.
15. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
16. Minimum concrete cover of 3 inches on all steel.
17. Crown top of piers for drainage and chamfer all exposed concrete edges 1 inch.
18. Compact backfill in 9 inch lifts. Remove all forms prior to backfill.

C. Specifications for equipment Shelters

1. Shelter installations must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The following equipment shelters shall be supplied:
 - a. One (1) Equipment shelter, one-piece, two-room Concrete Communications Equipment Shelter with a 75KW generator, 400 Amp. Service Panel, a 200 Amp sub-feed panel and ATS (automatic transfer switch) with installation included. The supplied equipment shelter shall be nominally sized 12 ft. x 38 ft. x 10 ft. (Height is inside dimension) and configured as a two-room shelter.
 - b. One (1) Equipment shelter, one-piece, one-room Concrete Communications Equipment Shelter without a standby generator with a 200 Amp. Service Panel, installation included. The supplied equipment shelter shall be nominally sized 12 ft. x 38 ft. x 10 ft. (Height is inside dimension) and configured as a one-room shelter.

- c. Both Equipment shelters shall have the following general specifications:
1. Two (2) cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four (4) inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four (4) rows of four (4) ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits and one single two inch PVC conduit sleeve for installation of S. O. cables to the tower lighting system, both with temporary end caps shall be installed. The actual location of these penetrations and sleeves must be confirmed with the Project Manager prior to the fabrication of the shelter.
 2. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
 3. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
 4. The shelters shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.
 5. Electric baseboard heater strips shall supply heating for all shelters, including the generator rooms of double room shelters. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
 6. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.

7. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
8. Each foundation shall be comprised of concrete pad with steel reinforcement. The foundations shall level each shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
9. The minimum floor loading design will be 300 lbs. per square foot
The minimum roof loading design will be 100 lbs. per square foot
The minimum wall loading design will be 34 lbs. per square foot
The minimum wind loading design will be 50 lbs. per square foot
10. Two reinforced steel finished doors shall be located on each shelter, per the attached drawings. The doors will be finished to match the appearance of the shelter. The doors shall be pre-hung, gasket sealed, insulated, approximately 3 foot by 7 foot, and in a metal frame. Door will be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three (3) point locking system for maximum security. The doors will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
11. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 ft. high X 1/8 in. rubber base trim against the floor.
12. The walls will be covered with a minimum of white wood-grained paneling or white vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x 4 ft. X 8 ft. plywood installed at one end of the equipment shelter that is painted to match the walls.
13. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five (5) ft. intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six (6) feet from boxes mounted at 22” intervals on the ceiling. Wiring for these drops shall be housed in “Sealtite” flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own

dedicated twenty (20) ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.

14. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
15. The equipment shelter equipped with the 75KW standby generator is to be provided with one (1) 400-amp, 20-position (minimum) load center, equipped with a minimum of twenty (20) 20-amp breakers. Breakers shall be "high magnetic" or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five (5) feet of the primary cable entry port. The shelter will be provided with a 400-Amp load center, and a 200-Amp sub feed panel shall be installed adjacent to, and fed from, the main service panel to provide electrical feed to the second one-piece equipment shelter.
16. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo's 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch (2") standoff insulators, connected to one (-1) ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two (2) 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.
17. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.
18. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. See Attachment J for details concerning number and arrangement of fixtures. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.

19. The shelters shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a “66 Block”:

- ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
- ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
- ◆ Generator Alarm – Output when generator is running.
- ◆ Entry/Intrusion – Output when either door is opened
- ◆ Fire and Smoke Alarm

20. The two-room equipment shelter shall have a partition wall separating the emergency generator from the room containing the RF equipment. This partition wall shall have a one (1) hour fire rating (from the inside out and outside in). The floor under this section shall be reinforced to handle additional loading. Two intake louvers and one exhaust fan with gravity louvers shall be installed. The powered louvers will default to a closed position in the event of a complete power failure. All louvers and openings will be wire covered for security and prevention of entry by rodents. A separate outside door shall be installed on this room and shall be identical to the equipment room door.

21. The lighting for this room shall be controlled by a separate wall switch internal to the room and located next to the entry door.

22. The standby generator supplied with the two-piece equipment shelter shall be one (1) 75 Kilowatt liquid propane vapor fueled, 1800-RPM generator, 94 kVA, 60 Hz, 120/240 volt, single phase with a properly sized Automatic Transfer Switch. The contractor will provide a new and unused, purchased and not leased, above ground 1,000-gallon fuel tank filled to rated capacity (liquid propane only).

23. Installation shall include all materials, parts, labor, etc., to provide a fully functional generator back-up system. Included in the installed price is the transfer switch and all associated wiring. Block heaters with necessary wiring are to be included. Fuel tank hookup, fuel tank, fuel tank pad and fuel supply piping to the shelter is to be provided by the site work contractor.

24. Fuel strainers on the propane fuel systems must be installed for proper drainage to prevent moisture buildup in the line. Proper sized flex fuel lines needs to be installed on all generators and the fuel line so as to not impede the proper flow of fuel and must not be sharply bent, or crimped. Proper venting of the fuel system must be installed to ensure no buildup of pressure and safe venting will occur. Fuel lines run in conduit or sleeves must be sealed from moisture. Proper battery chargers must be

installed for the appropriate system, either 12 VDC or 24 VDC, 110 VAC. Note: two (2) 12 VDC battery chargers is not acceptable on 24-volt systems.

25. The contractor must perform on-site startup of the generator under full load.
26. All alarm outputs from the generator are to be extended to the radio compartment of the shelter and terminated in a "66 block".
27. All wiring for the generator must be routed overhead. It is unacceptable to cross the floor with conduits.
28. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, 2-inch ground straps, to the single ground point directly below the main cable entry port.
29. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed 2 feet outside the shelter footprint in order to be outside the drip line of the shelter.
30. All grounds must be bonded together. This includes the generator, the shelter, the fuel tank, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event 5 Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one (1) fully functional, 450 ft. above ground level, three (3) legged, heavy duty, self-supporting, two-way microwave radio tower.
2. Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and mounting 24 inch cable ladders or wave guide stacker system on two faces of the tower (each must accommodate at least 15-3/4 inch snap-

ins), and supplying and installing two (2) nominal 24 inches wide by 20 ft. long extruded metal, 4 post, no cantilever ice bridges from the tower to the equipment shelter cable entry ports. The ice bridges will be electrically insulated from the tower.

4. The tower shall be erected to a height of 450 ft. (AGL) above ground in such a manner as to assure straightness and plumb. The top 60 ft. (minimum) of the 450 ft. tower shall contain no slope.
5. The Contractor shall purchase and install one (1) FAA approved, medium intensity, dual tower lighting system.
6. The Contractor shall install the following lightning protection:
 - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
 - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
7. Purchase and installation of two (2) equipment shelters: one (1) two-room 12 x 38 x 10 ft. concrete equipment shelter (height is inside dimension) with a 75 KW standby generator and one (1) one-room 12 x38 x10 ft concrete equipment shelter without a standby generator. The equipment shelters are to rest flush on the poured concrete foundations without showing any gaps between equipment shelters and pads and leveled to within ½ degrees.
8. Purchase and installation of one (1) new 1,000 gallon LP propane fuel tank with hookup to the generator and shall include first propane fill-up.
9. Provision and installation of a liquid cooled, 1800 RPM, 94KVA, 60 hertz, 75 KW liquid propane vapor fueled generator complete with a 400-Amp automatic transfer switch capable of zero crossover switching to eliminate service interruptions.
10. Generator start-up and test under load after permanent power is connected to the equipment shelter.
11. Purchase and install one (1) nominal 20 ft., 24-inch wide, 4-post, no cantilever ice bridge.
12. Purchase and installation of three (3) 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one (1) electric company meter face.

**PRICE SHEET
EXAMPLE TASK ORDER # 3**

**450-FT SELF SUPPORTING TOWER
AND
2 - 12X38X10-FT SHELTERS**

PROJECT LINE ITEM

PRICE

A: SITE PREPARATION

1. Clearing and grading of one (1) 100ft x 100ft area

2. Purchase and installation of one (1) tower foundation for one (1) 450-ft tower

3. Purchase and installation of one (1) 4 ft x 20 ft concrete foundation to install one (1) 1,000 gallon liquid propane fuel tank

4. Purchase and installation of two (2) 12 ft x 38 ft concrete foundations to install two (1) 12x38x10-ft concrete equipment shelters

5. Site restoration, grading, grubbing, reseeding, installation of storm water management

6. Purchase and installation of temporary storm-water management and soil erosion measures during construction

B: INSTALLATION

<p>7. Purchase, shipping and erection of one (1) fully functional, 450-ft self supporting tower</p>	
<p>8. Purchase and installation of one (1) medium intensity, dual mode, FAA approved tower lighting system</p>	
<p>9. Purchase, shipping and installation of one (1) two-room 12x38x10-ft concrete equipment shelter (height is inside dimension) with a 75KW standby generator</p>	
<p>8. Purchase, shipping and installation of one (1) one-room 12x38x10-ft concrete equipment shelter (height is inside dimension) without a standby generator</p>	
<p>10. Purchase and installation of one (1) new 1,000 gallon liquid propane fuel tank including first fuel fill-up</p>	
<p>11. Generator start up test under full load</p>	
<p>12. Purchase and installation of one (1) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.</p>	
<p>13. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel of the standby generator equipped shelter</p>	
<p>14. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the standby generator equipped shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch</p>	

<p>15. Purchase and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 100 ft. long by 100 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	
<p>16. Purchase and installation of 3 – 4inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one (1) electric company meter face.</p>	
<p>TOTAL PRICE TASK ORDER #3 (ITEM 1 THROUGH 16 ADDED)</p>	

Example of Task Order # 4

Monopole Tower 75-ft AGL and 12 X 28 X 10-FT Equipment Shelter

SCOPE OF SERVICES AND SPECIFICATIONS

The Contractor shall provide all coordination, functions, labor, materials, insurance and purchase items required to install a fully functional microwave and wireless communications site in accordance with the following specifications:

A. Site preparation work

1. Clearing and grading of approximately 60 ft. x 60ft. area.
2. Purchase and installation of a monopole tower foundation.
3. Purchase and installation of one (1) one-room 12 ft. x 28 ft. equipment shelter foundation as per equipment shelter manufacturer supplied specifications. The supply and installation of the equipment shelter and foundation shall include: the construction of one (1) concrete foundation with integrated continuous stoops for the doors, designed to support one (1) 12x28x10 ft. concrete equipment shelter (height is inside dimension). The equipment shelter foundation shall be provided at the same time as the tower foundation.
4. Upon completion of tower installation, the Contractor shall re-grade and install storm-water management, grub the entire site extending two (2) ft. below finished grade and two (2) ft. around the perimeter of the fence line; install filter cloth and defoliant and cover the entire site with crusher/run. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
5. The Contractor shall provide and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 ft. long by 60 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.
6. The Contractor shall install temporary storm-water management measures during the construction. Disposition of any spoils shall be approved by the State Project Manager prior to its removal.
7. The Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.

8. The Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Tower Specifications

1. The monopole tower shall be galvanized and constructed of high-strength steel. All components and hardware are to be hot-dip galvanized with a zinc coating (per EIA standards) after fabrication. A zinc coating shall be permanently fused to the steel, both inside and outside, so all surfaces are protected and no painting is required for rust protection. Upon delivery, the tower shall be subject to approval by the State Project Manager and the State Program Manager.
2. Supplied materials, including, but not limited to, equipment shelter and tower, shall be new, unused and shall meet the latest design and fabrication standards of the Electronics Industry Association (EIA). The tower shall have a safety climbing cable installed. All supplied materials shall be purchased, not leased.
3. The Contractor with the State Project Manager shall coordinate exact placement of the monopole tower and shelter.
4. The monopole tower shall be required to meet or **exceed** the latest EIA 222-F standards for this type of tower with the State supplied loading design and **a wind loading of 80 M.P.H. concurrent with 1/2- inch of radial ice.** The monopole tower and associated installation shall conform to all local, County, State and Federal equipment shelter codes. The State of Maryland shall be responsible for obtaining Federal Aviation Administration (FAA) approval and permits.
5. Proper and thorough grounding methods shall be employed to provide maximum lightning protection.
6. The Contractor shall use soil borings supplied by the State for analysis to assure that the engineered tower foundation and the calculated ground loadings are acceptable. The Contractor shall furnish one (1) copy of the foundation designs and the ground loading calculations certified by a Maryland registered Professional Engineer (P.E.) to the State Project Manager and one (1) copy to Maryland State Department of Budget & Management at the address identified in paragraph 33.2 of the contract, attachment A. The Contractor shall furnish a statement that the engineered monopole tower foundation and the calculated ground loadings meet the manufacturer's recommended requirements.
7. Step bolts and safety climbs are to be provided as part of the monopole tower.
8. Concrete strengths to equal 3000 PSI at 28 days.
9. Non-chloride, non-corrosive concrete set accelerate may be utilized in compliance with ASTM-C-494 type C and ACI-318.

10. Water reducing admixture may be utilized in compliance with ASTM-C-494.
11. All admixtures should be dispensed into fresh concrete and sufficiently mixed. All admixtures must be added separately.
12. Minimum concrete cover of 3 inches on all steel.
13. Crown top of piers for drainage and chamfer all exposed concrete edges 1 inch.
14. Compact backfill in 9 inch lifts. Remove all forms prior to backfill.

C. Specifications for Equipment Shelter

1. Shelter installation must be in conformance with manufacturer's requirements for application of warranties provided by the manufacturer.
2. The equipment shelter shall be a one-piece, one-room concrete communications equipment shelter supplied without a standby generator. The equipment shelter shall have a 200 Amp. Service Panel included. The supplied equipment shelter shall be nominally sized 12 ft. x 28 ft. x 10 ft. (Height is inside dimension).
3. Two (2) cable entry points complete with weatherproof caps shall be provided for antenna cable entry. One entry point will be located on the long side of the equipment shelter and the second entry point will be located on the end wall of the equipment shelter between the air conditioner units. Each port within both assemblies shall be four (4) inches in diameter, and shall be located with the top of the assembly located directly under the cable rack, in four (4) rows of four (4) ports each. In addition to the cable entry points, one single four inch PVC conduit sleeve for communications conduits, with temporary end cap shall be installed. The actual location of this penetration and sleeve must be confirmed with the Project Manager prior to the fabrication of the shelter.
4. Cable ladders (24 inches wide) shall be mounted eight feet above the floor, measured from the floor to the middle of the bottom of the cable ladder.
5. Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter will be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units will be weather/rodent and tamper proof.
6. The shelter shall be equipped with 16-inch ventilation fans with gravity operated back draft louvers and 16-inch gravity intake damper with filter and hood (bug and rodent

intrusion resistant). Each fan shall be connected to a thermostatic device to allow automatic fan on-off control. The openings will be provided with shutters and weather hoods. All required exhaust piping and intake and exhaust plenums required for the manufacturer's recommended air flow shall be included as part of the installed equipment. All openings in the shelter structure for the provision of entry or exit of cables, equipment, ventilation, etc., must be sealed to prevent the invasion of the shelter interior by insects, rodents and external moisture.

7. Electric baseboard heater strips shall supply heating for the shelter. Thermostats mounted on a wall opposite each heater shall control these heaters. The heaters will be sufficient for the size of the equipment shelter to maintain a room temperature of 72 degrees F.
8. Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have an R-19 (minimum) rating.
9. Concrete Construction – The wall outer finish will be natural stone aggregate finish with an aesthetically pleasing earth tone.
10. The equipment shelter foundation shall be comprised of concrete pad with steel reinforcement. The foundation shall level the shelter such that all foundation-to-shelter contact points have equal loads. The equipment shelter is to rest flush on the paved concrete foundation without showing any gaps between shelter and pad and to be level to within ½ degree. The shelter shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the shelter. Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.
11. The minimum floor loading design will be 300 lbs. per square foot
The minimum roof loading design will be 100 lbs. per square foot
The minimum wall loading design will be 34 lbs. per square foot
The minimum wind loading design will be 50 lbs. per square foot
12. The shelter shall have one reinforced steel finished door. The door will be finished to match the appearance of the shelter. The door shall be pre-hung, gasket sealed, insulated, approximately 3 foot by 7 foot, and in a metal frame. Door shall be supplied with door-closer, magnetic weather stripping, drip strip over door, doorstop, door sweep and a 42-inch door canopy. Door checks and door stops shall be provided along with a three (3) point locking system for maximum security. The door will have non-removable ball bearing hinges and deadbolt locks with tamper plates installed.
13. The equipment shelter floor shall be covered with 1/8 inch, 12 inches x 12 inches vinyl tile, light in color (beige, tan or white). The walls will be trimmed with a 4 ft. high X 1/8 in. rubber base trim against the floor.
14. The walls will be covered with a minimum of white wood-grained paneling or white

vinyl over ½ inch plywood. There will be a telephone mounting board of ¾ inch x 4 ft. X 8 ft. plywood installed at one end of the equipment shelter that is painted to match the walls.

15. The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five (5) ft. intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be installed 18 inches above finished floor. Horizontal runs of conduit will be installed a minimum of 7-1/2 feet above the floor whenever possible with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall. Two weatherproof outlets will be installed on the exterior of the shelter. These outlets are to be located at both ends of the shelter. In addition, circuits supplying power to the equipment racks in shelters shall extend downward six (6) feet from boxes mounted at 22" intervals on the ceiling. Wiring for these drops shall be housed in "Sealtite" flexible conduit and each drop shall be terminated in a quad receptacle box. Each circuit drop shall have its own dedicated twenty (20) ampere circuit breaker. These drops shall be planned to fall immediately adjacent to the edge of the cable tray. The exact location for each drop must be confirmed with the Project Manager before the shelter is fabricated.
16. Power to the shelter shall be fed through a properly sized 120V/208V, single-phase disconnect switch mounted on the exterior wall of the shelter.
17. Shelter is to be provided with 200-Amp, 20-position (minimum) load center, equipped with a minimum of twenty (20) 20-amp breakers. Breakers shall be "high magnetic" or high inrush current type (Square D, HM or equivalent). This box shall be installed at one end of the equipment area within five (5) feet of the primary cable entry port. The shelter will be provided with a 200-Amp load center.
18. An interior system ground (halo) with a single #2 AWG stranded wire will be provided with proper connections to the shelter and, in turn, to the tower ground system. The halo will have a 6-inch break roughly opposite the Master Ground Bar. The halo's 6-inch break will not be bridged by any installed metal conduits. The internal ground system will be mounted on the wall using 2-inch (2") standoff insulators, connected to one (1) ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar that is installed directly under the main cable entry port. The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system. These copper ground bars will be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10-foot (minimum) solid copper grounding rod (provided by the shelter contractor) shall be driven into the ground soil and subsurface directly under the cable entry port of the shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system. A minimum of two (2) 2-inch copper strapping shall be used for the exterior ground connection. All exterior connections shall be exothermically welded to ensure proper connection. Electrical ground will be bonded to the RF ground.

19. An IEEE Type 1 SAD/MOV protection device will be installed across the main utility service entry. An IEEE Type 2 MOV protection device will be installed at the main power input inside the shelter, by means of a 60-Ampere fused breaker, across the utility lugs of the transfer switch. The devices will be installed inside the equipment shelter.

20. 48-inch, two or four-tube, fluorescent fixtures shall provide sufficient lighting (minimum 50-foot candles) for the shelters. The lights shall be controlled by a wall switch internal to the shelter, and located at the entry door. An exterior entry light shall be installed outside the doorways of the structure. This light shall be controlled by a photocell wired through a wall switch inside the shelter.

21. The shelter shall be pre-wired, with the following functions, to a common point in the radio compartment and terminated with a "66 Block":

- ◆ High Temperature Alarm – Adjustable for over-temperature alert (may be integrated with HVAC system).
- ◆ Low Temperature Alarm – Adjustable for under-temperature alert (may be integrated with HVAC system).
- ◆ Generator Alarm – Output when generator is running.
- ◆ Entry/Intrusion – Output when either door is opened
- ◆ Fire and Smoke Alarm

22. An external ¼-inch x 4 inches x 20 inches, 27 hole copper ground bar is to be installed on the outside of the shelter directly under the main cable entry port and attached with two, solid tinned copper, 2-inch ground straps, to the single ground point directly below the main cable entry port.

23. An external ground ring is to be provided around the shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven shorter rods are acceptable if driven at the proper intervals. The external ground ring is to be placed 2 feet outside the shelter footprint in order to be outside the drip line of the shelter.

24. All grounds must be bonded together. This includes the shelter, the fencing, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 OHMS. The State shall test all grounds using a fall-of-potential method test to determine compliance. In the event 5 Ohms cannot be reached by reasonable means and through no fault of the vendor, the State will determine the course of action to be

taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 OHMS for the site to be acceptable for reasons of personal safety.

D. Specifications for Installation

1. Purchase and installation of one (1) fully functional, 75 ft. above ground level, galvanized, heavy duty, monopole tower.
2. Contractor is to assume normal soil conditions.
3. Installation of the tower shall include placing a foundation which is certified signed and stamped by a Maryland registered Professional Engineer (**certification must be provided with the response to the bid**) that it is designed in accordance with the tower manufacturer's recommendations based upon the soil borings provided by the State, erecting the tower, supplying and installing one (1) nominal 24 inches wide by 20 ft. long extruded metal, 4 post, no cantilever ice bridge from the tower to the equipment shelter cable entry ports. The ice bridge will be electrically insulated from the tower.
4. The tower shall be erected to a height of 75 ft. (AGL) above ground in such a manner as to assure straightness and plumb.
5. The following lightning protection devices shall be installed:
 - c. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board.
 - d. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch.
6. Purchase and installation of one (1) 12 x 28 x 10 ft. concrete equipment shelter (height is inside dimension) without a standby generator. The equipment shelter is to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within ½ degrees.
7. Purchase and install one (1) nominal 20 ft., 24-inch wide, 4-post, no cantilever ice bridge.
8. Purchase and installation of three (3) 4-inch PVC conduits for electrical service, each approximately 60 feet long, between the electric company demarcation point and the Contractor supplied backboard and from the backboard into the equipment shelter. Contractor shall purchase and install one (1) electric company meter face.

**PRICE SHEET
EXAMPLE TASK ORDER #4**

**75-FT MONOPOLE AND
12X28X10 SHELTER**

PROJECT LINE ITEM

PRICE

A: SITE PREPARATION

1. Clearing and grading of one (1) 60 ft x 60 ft area
2. Purchase and installation of one (1) tower foundation for one (1) 75-ft monopole
3. Purchase and installation of one (1) 12 ft x 28 ft concrete foundation to install one (1) 12x28x10-ft concrete equipment shelter
4. Site restoration, grading, grubbing, reseeding, installation of storm water management
5. Purchase and installation of temporary storm-water management and soil erosion measures during construction

B: INSTALLATION

6. Purchase, shipping and erection of one (1) fully functional, 75-ft monopole tower

<p>7. Purchase, shipping and installation of one (1) 12x28x10-ft concrete equipment shelter (height is inside dimension) without a standby generator</p>	
<p>8. Purchase and installation of one (1) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge from the equipment shelter to the tower.</p>	
<p>9. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel</p>	
<p>10. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch</p>	
<p>11 Purchase and install a ten (10) ft. high-galvanized chain link fence, with a ten (10) ft. wide security gate, around the site (includes tower and equipment shelter). This location will require a perimeter fence approximately 60 ft. long by 60 ft. wide. The security gate shall be chained and padlocked and the State Project Manager shall have the master key and shall control access to the site.</p>	
<p>12. Purchase and installation of three (3) – 4inch PVC conduits, each approximately 60 feet long, between the electric company demarcation point and a Contractor supplied backboard and from the backboard into the equipment shelter, and the purchase and installation of one (1) electric company meter face.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>TOTAL PRICE TASK ORDER #4 (ITEM 1 THROUGH 12 ADDED)</p> </div>	

Example of Task order # 5

Purchase and Installation of four (4) Prefabricated Equipment Shelters

SCOPE OF SERVICES AND SPECIFICATIONS

The contractor shall provide all coordination, shipping, functions, labor, materials, insurance and purchase items required to install three (3) fully functional Microwave/Wireless Communications equipment shelters at three (3) different tower sites in Harford County. The equipment shelter supplied shall have the following size/configuration:

One (1) 12 ft. X 28 ft. X 10 ft. (height is inside dimension) – No standby generator
One (1) 12 ft. X 38 ft. X 10 ft. (height is inside dimension) – No standby generator
One (1) 12 ft. X 38 ft. X 10 ft. (height is inside dimension) with 75 kW standby generator, in accordance with the following specifications:

A. Site Preparation Work:

1. Clearing and grading of three (3) areas, each approximately 15 ft x 41 ft.
2. Purchase and installation of one (1) 4 ft. x 20 ft. concrete fuel tank foundation.
3. Purchase and installation of one (1) 12 ft. X 28 ft. and two (2) 12 ft. x 38 ft. concrete equipment shelter foundations per manufacturers specifications.
4. The supply and installation of each shelter foundation shall include construction of integrated continuous stoops for the doors.
5. Upon completion of shelter installation, the Contractor shall re-grade, re-grub, re-seed and install storm-water management, in order to restore each site to its original condition.
6. Contractor shall extend the existing fence line to include the new equipment shelter and fuel tank.
9. The Contractor shall install temporary storm-water management and soil erosion measures during construction at each site.

10. Disposition of any spoils from each site shall be approved by the State Project Field Engineer prior to its removal.
11. The Contractor should plan for normal soil conditions as defined by Attachment J – Typical Soil Borings.
12. The Contractor should plan for site conditions to be relatively level with rough brush and small trees with a diameter of no larger than 4 inches.

B. Installation work required at each site:

1. Purchase and installation of either one (1) 12 ft. X 28 ft. X 10 ft., one (1) 12 ft. X 38 ft. X 10 ft. without generator or one (1) 12 ft. X 38 ft. X 10 ft. with 75 kW standby generator.
2. Contractor is to assume normal soil conditions.
3. The equipment shelters are to rest flush on the poured concrete foundation without showing any gaps between equipment shelter and pad and leveled to within ½ degree;
4. Purchase and install one (1) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridge at each site;
5. The following lightning protection shall be installed at each site:
 - a. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board;
 - b. An IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch;
6. Purchase and install equipment shelter grounding at each site and connect the equipment shelter grounding ring and fuel tank grounding ring to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O); the Contractor shall perform ground resistance readings prior to, and after, installation of the building grounding. Resistance readings may not increase from the initial reading after ground system work is completed.
7. The purchase and installation of three (3) 4-inch Schedule 80 conduits each approximately 50-feet long to provide for electrical service from the existing backboard service meter into each shelter, and the purchase and installation of an electrical company's meter face at each of the sites.

C. Prefabricated equipment shelters general specifications:

SIZE

12 ft. X 28 ft. X 10 ft. (height is inside dimension) – no generator
12 ft. X 38 ft. X 10 ft. (height is inside dimension) – no generator
12 ft X 38 ft. X 10 ft. (height is inside dimension) – with 75 kW standby generator

Note: The shelter wall thickness and strength shall comply with Motorola's R56 requirements for equipment shelters.

12 ft. X 28 ft. X 10 ft. – input 200A – S. Panel: 200A
12 ft. X 38 ft. X 10 ft. – input 400A – S. Panel: 200A – Sub-feed: 200A
12 ft. X 38 ft. X 10 ft. – input 400A – S. Panel: 200A – Sub-feed: 200A

CABLE ENTRY PORTS

Two-cable entry ports shall be provided, a main, located with the top of the assembly located directly under the cable rack near the Master Grounding Bar and one for future use, located between the two air conditioning units. Each port shall be four inches in diameter and have four rows of four ports each for a total of 16 ports.

CABLE LADDERS

Cable ladders, 24-inches wide, shall be mounted eight feet above the floor, measured from the floor to the bottom of the cable ladder, and shall be oriented as shown in the supplied equipment shelter drawing.

AIR CONDITIONING

Two 5-ton 230/208V-Single-phase, dual (redundant) wall-mounted, vertical, self contained HVAC units with 5-kw heat strips shall be installed at the locations specified on the equipment shelter drawing. The equipment shelter shall be supplied with a 16" exhaust fan and hood and a 16" intake damper with filter and hood. Separate circuit breakers for each unit shall be installed in the main load circuit panel. The provided HVAC units shall have sufficient capacity for the equipment shelter size supplied, fully loaded with equipment. Each unit shall contain a time delay startup relay, low ambient control, and a forced air resistive heat strip. The outside portions of the units shall be weather/rodent and tamper proof.

VENTILATION

All equipment shelters shall be equipped with an exhaust fan with gravity flow back draft louvers and screened rain hood, intake damper with screened and filtered rain hood and thermostat. All required exhaust piping and intake and exhaust plenums required for the manufacturers recommended air flow shall be included as part of the installed equipment.

INSULATION

Insulation shall be non-combustible, with a vapor barrier. Wall and floor thickness shall provide an R-11 (minimum) rating, and the roof shall have a R-19 (minimum) rating.

FINISH

Concrete construction. The outer finish shall be a natural stone aggregate finish with an aesthetically pleasing earth tone.

FOUNDATIONS

Each foundation shall be comprised of a concrete pad with steel reinforcement. The foundations shall level the provided equipment shelter such that all foundation-to-equipment shelter contact points have equal loads. There shall be no twisting moment to the final, level structures. The shelter provided shall have a poured concrete entrance stoop for each entrance, and steps if necessary, to provide safe entry to the equipment shelter.

Any installations requiring stoops more than 24 inches above grade shall have safety rails installed.

FLOOR LOADING

The minimum floor loading design shall be 300 lbs. Per square foot (PSF).

ENTRY DOORS

The 12 ft. X 38 ft. X 10 ft. equipment shelters shall have two entry doors.

The doors shall be 1-3/4 inch thick, made have reinforced 18-gage steel and have an approximate 3 feet x 7 feet size. The door shall be finished to match the appearance of the equipment shelter.

The door shall be pre-hung in a metal frame, gasket sealed and insulated.

Door shall be supplied with: Door-closer, magnetic weather stripping, drip-strip over door, doorstop, door-sweep and 42-inch door-canopy.

The door shall be provided with a 3-point locking system for maximum security. The door shall have non-removable, fully mortised ball bearing hinges and a standard duty single deadbolt lock with a tamper plate installed.

ELECTRICAL

The electrical installation and wiring shall conform to the latest version of the National Electrical Code. Surface mounted, grounded, duplex outlets shall be provided at five feet intervals (where possible) around the exterior walls. All wiring shall be installed in surface mount EMT conduit. Outlets shall be equally spaced. Outlets shall be installed 18 inches above finished floor.

Horizontal runs of conduit shall be installed a minimum of 7-1/2 feet above the floor (whenever possible) with vertical connections to the surface mounted devices to minimize interference with installing equipment against the wall.

Two weatherproof duplex outlets as shown on each equipment shelter drawing shall be installed on the exterior of the equipment shelters, located between the air conditioners on the end of the equipment shelter.

In addition, 2 circuits supplying power to the microwave equipment rack in the equipment shelter shall extend downward six feet from Sealtite boxes mounted at 22 inch intervals on the ceiling as shown in the supplied Site Floor Layout drawing. Wiring for these circuit shall be housed in "Sealtite" flexible conduit and the drop shall be terminated in a quad-receptacle box. Each circuit drop shall have its own dedicated 20 Amp circuit breaker. This drop shall be planned to fall immediately adjacent to the edge of the cable tray.

Power to the equipment shelter shall be 200-Amp or 400-Amp, 120/240 Volt, single-phase to a fuse-protected safety switch mounted on the exterior of the equipment shelter.

A 200 Amp or 400 Amp, 40-position load center shall be provided. The equipment shelters supplied with a 400 Amp load center shall have one (1) 200 Amp Sub-feed panel and one (1) 150-amp breaker for UPS service installed. Breakers shall be "high magnetic" or high inrush current type. ("Square D" or equivalent). The load center shall be installed at one end of the equipment area. Commercial load center and UPS load centers shall share this space. An IEEE Type 1 SAD/MOV surge suppression device shall be installed across the main utility panel, and an IEEE Type 2 MOV protection device shall be installed at the main power input inside the equipment shelter by means of a fused 60A breaker, across the utility lugs of the Automatic transfer switch (ATS).

UPS

The uninterruptible power supply (UPS) electrical installation and wiring shall conform to the latest version of the National Electrical Code and Motorola R56 Standards and Guidelines for Communication Sites. A 150 Amp, 48-position UPS load center shall be provided. Breakers shall be "high magnetic" or high inrush current type. ("Square D" or equivalent). The UPS load centers shall be located in close proximity to the commercial load center. An IEEE Type 1 SAD/MOV surge suppression device shall be installed across the UPS load center. The UPS circuits shall each have its own dedicated individual 3-wire branch circuit.

The equipment shelters shall have UPS wiring dropped above the cable trays using drop down flex conduit. Refer to the Attachment F Typical Shelter Layout Drawing.

The row nearest the entrance door is designated as row 1.

The adjacent rows of racks are designated as 2, 3 and 4 from left to right. The rack position for each row is designate as rack 1, closest to the wall containing the waveguide port, through rack 4, closest to the entry door.

The circuits supplying UPS power to the equipment racks in the equipment shelter shall extend downward 2 1/2 feet from boxes mounted at 22 inch intervals on the ceiling as shown in the supplied Attachment F Typical Shelter Layout Drawing. Wiring for these simplex circuits shall be housed in "sealtite" flexible conduit and each drop shall be tagged showing the associated circuit. Each 3-wire simplex circuit drop shall have its own dedicated 20-amp breaker. These

drops shall be planned to fall center to the cable tray, beginning 22 inches off the back wall and mounted at 22-inch intervals.

Row 1 rack 4 shall have eight dropped circuits
Row 2 rack 1 shall have eight dropped circuits
Row 2 rack 2 shall have eight dropped circuits
Row 2 rack 3 shall have eight dropped circuits
Row 2 rack 4 shall have two dropped circuits
Row 3 rack 1 shall have one dropped circuits
Row 3 rack 2 shall have one dropped circuits
Row 3 rack 3 shall have five dropped circuits
Row 3 rack 4 shall have five dropped circuits
Row 4 rack 1 shall have one dropped circuits
Row 4 rack 2 shall have one dropped circuits
Row 4 rack 3 shall have zero dropped circuits
Row 4 rack 4 shall have zero dropped circuits

LIGHTING

Seven (7) 48-inch, 40 Watt, four-tube fluorescent fixtures shall provide lighting inside the equipment shelter; five inside the radio compartment and two inside the generator compartment. The lights shall be controlled by a wall switch internal to the equipment shelter, and located near the entry door.

A 100-watt incandescent entry light shall be installed outside each doorway of the equipment shelter. The light shall be controlled by a photocell.

ALARMS

The equipment shelter shall be pre-wired with the following functions, to a common point in the electronic equipment and terminated with a "type 66 Block" located on a 4 x 8 foot sheet of plywood provided for wiring terminations.

- High Temperature Alarm
- Low Temperature Alarm
- Generator Alarm
- Entry/Intrusion Alarm
- Fire and Smoke Alarm
- UPS Alarms

GENERATOR

The generator supplied with the 12 ft. X 38 ft. X 10 ft. equipment shelter shall be a 75 kW, 94 KVA, 1800RPM, 60 hertz, liquid cooled, single phase, liquid propane vapor fueled generator with full metering and a 400 Amp automatic transfer switch installed.

GROUNDING AND LIGHTNING PROTECTION

All grounding shall conform to Motorola R-56 Guidelines.

An interior system ground (halo) with a single bare #2 AWG stranded wire shall be provided with proper connections to the equipment shelter and, in turn, to the tower ground system.

The halo shall have a 6-inch break roughly opposite a Master Ground Bar (MGB).

The internal ground system shall be mounted on the wall using 2" standoff insulators, connected to one ¼" x 4" x 20", 27 hole copper Master Ground Bus Bar installed directly under the main cable entry port. **The second ¼-inch x 4 inches x 20 inches, 27 hole copper master ground bus bar, mounted between the air conditioners under the auxiliary cable entry port, shall not be connected to the internal ground system.**

These copper ground bars shall be connected with a single #2 AWG solid tinned copper wire to a single exterior ground rod. One, 10 feet long (minimum) solid copper grounding rod (provided by the contractor) shall be driven into the ground soil and subsurface directly under the main cable entry port of the equipment shelter. The rod shall, in turn, be connected to the tower grounding system and the internal grounding system.

A minimum #2 AWG solid tinned copper wire or 2-inch copper strapping shall be used for each exterior ground connection. All exterior connections shall be cad-welded to ensure proper connection. The electrical ground shall be bonded to the RF ground. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board. An IEEE Type 2 MOV protection device shall be installed, by means of a 60A breaker, across the utility lugs of the disconnect switch if the main service enters the shelter.

A minimum #2 AWG solid tinned copper wire or 2-inch copper strapping shall be used for each exterior ground connection. All exterior connections shall be cad-welded to ensure proper connection. The electrical ground shall be bonded to the RF ground. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board. An IEEE Type 2 MOV protection device shall be installed, by means of a 60A breaker, across the utility lugs of the disconnect switch if the main service enters the shelter.

The electrical ground shall be bonded to the RF ground. An IEEE Type 1 SAD/MOV protection device shall be installed across the main utility panel board. An IEEE Type 2 MOV protection device shall be installed, by means of a 60A breaker, across the utility lugs of the disconnect switch if the main service enters the shelter.

One external ¼"x4"x20", 27 hole copper ground bar shall be installed on the outside of the equipment shelter directly under the main cable entry port and attached with a single solid tinned copper #2 AWG wire to the single ground point directly below the main cable entry port.

An external ground ring is to be provided around the equipment shelter foundation. The buried external ground ring shall be in direct contact with the earth at a depth of 30 inches below the earth's surface with ground rods driven into the earth at intervals not to exceed twice the ground rod length. In the event 10-foot ground rods cannot be driven, shorter rods are acceptable if driven at the proper intervals.

All grounds must be bonded together. This includes the generator, the equipment shelter, the fuel tank, the equipment shelter grounding system and the tower. The ground test reading must not exceed 5 Ohms. The State shall test all grounds using a fall-of potential method test to determine compliance. In the event 5 Ohms cannot be reached, by reasonable means and no fault of the vendor, the State shall determine the course of action to be taken by the vendor at an additional cost to the State. Grounds must test fewer than 25 Ohms for the site to be acceptable for reasons of personal safety.

GENERAL

All openings to the exterior of the equipment shelter shall be properly sealed; covers used to cap unused cable entry port shall fit snugly (no cable ties). All exterior shrouds, fan louvers and air conditioning units shall be properly caulked to prevent moisture intrusion into the equipment shelter

**PRICE SHEET
EXAMPLE TASK ORDER #5
3 –PREFABRICATED CONCRETE
EQUIPMENT SHELTERS**

PROJECT LINE ITEM	PRICE
A: SITE PREPARATION	
1. a. Clearing and grading of one (1) approximately 15ft. x 41ft. areas	_____
1. b. Clearing and grading of two (2) approximately 15ft. x 41 ft. areas	_____
2. Purchase and installation of one (1) 4 ft x 20 ft concrete foundation to install one (1) 1,000 gallon liquid propane fuel tank	
3. Purchase and installation of one (1) 12 ft. X 28 ft. concrete foundation to install one (1) 12 ft. X 28 ft. X 10 ft. concrete equipment shelter	

<p>4.a.Purchase and installation of one (1) 12 ft. X 38 ft. concrete foundation to install one (1) 12 ft. X 38 ft. X 10 ft. concrete equipment shelters.</p> <p>4.b. Purchase Installation of two (2) 12 ft. X 38 ft. concrete foundations to install two (2) 12 ft. X 38 ft. X 10ft. concrete equipment shelters.</p>	
<p>5. Site restoration, grading, grubbing, reseeding, installation of storm water management for three (3) construction sites</p>	
<p>6. Extension of the existing fence line to include the new equipment shelter and fuel tank</p>	
<p>7. Purchase and installation of temporary storm-water management and soil erosion measures during construction for three (3) construction sites</p>	
<div style="border: 1px solid black; padding: 5px; display: inline-block;">B: INSTALLATION</div>	
<p>8. Purchase, shipping and installation of one (1) 12 ft. X 28 ft. X 10 ft. concrete equipment shelter</p>	
<p>9. Purchase, shipping and installation of one (1) 12 ft. X 38 ft. X 10 ft. concrete equipment shelter</p>	
<p>10.Purchase, shipping and installation of one (1) 12 ft. X 38 ft. X 10 ft. concrete equipment shelter complete with one (1) 75 kW standby generator</p>	
<p>11.Purchase and installation of one (1) new 1,000 gallon liquid propane fuel tank, including first fuel fill-up</p>	
<p>12.Generator start up test under full load for one (1) site</p>	

<p>13. Purchase and installation of three (3) nominal 20-foot, 24-inch wide, 4-post, no cantilever ice bridges from the equipment shelters to the tower.</p>	
<p>14. Purchase and installation of an IEEE type 1 SAD/MOV protection device across the main utility panel of each equipment shelter</p>	
<p>15. Purchase and installation of an IEEE type 2 MOV protection device at the main power input inside the equipment shelter, by means of a fused 60A breaker, across the utility lugs of the transfer switch of each equipment shelter</p>	
<p>16. Purchase and install grounding associated with the equipment shelter and fuel tank and connect to the existing tower/site grounding in accordance with the most recently published Motorola R-56 guidelines (98R82904Y01-O) - three (3) construction sites</p>	
<p>17. Purchase and installation of three (3) 4-inch Schedule-80 conduits, each approximately 50 feet long, from the existing backboard into the equipment shelter at three different sites, and the purchase and installation of one (1) electric company meter face at three construction sites.</p>	
<div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>TOTAL PRICE TASK ORDER #5 (ITEM 1 THROUGH 17 ADDED)</p> </div>	

**ATTACHMENT E-1
PRICE SHEET SUMMARY FORM
050R4800143
STATEWIDE WIRELESS COMMUNICATIONS INFRASTRUCTURE
SITE INSTALLATIONS**

A TASK ORDERS	B TOTAL PRICE
<u>EXAMPLE OF WORK # 1</u> 180ft. Self-supporting Tower and one (1) 12x38x10ft. shelter with generator.	\$
<u>EXAMPLE OF WORK #2</u> 330ft. Self-supporting Tower and one (1) 12x38x10ft. shelter with generator.	\$
<u>EXAMPLE OF WORK # 3</u> 450ft. self-supporting Tower, one (1) 12x38x10ft. shelter with generator and one (1) 12x38x10ft. shelter without a generator	\$
<u>EXAMPLE OF WORK #4</u> 75ft. Monopole and one (1) 12x28x10ft. shelter without a generator.	\$
<u>EXAMPLE OF WORK #5</u> Three (3) shelters, one (1) 12x38x10ft. with generator, one (1) 12x38x10ft. without generator and one (1) 12x28x10 without generator.	\$
	C
<u>TOTAL PRICE (ADD EXAMPLES OF WORK 1 THROUGH 5)</u>	\$

