SECTION 677
EQUIPMENT SHELTER

677-1 Description.

Furnish and install an equipment shelter as shown in the Plans. Ensure that all materials furnished, assembled, fabricated, or installed are new products.

677-2 Materials.

677-2.1 General: Ensure that the shelter includes a secure door; power distribution panels; a heating, ventilation, and air conditioning (HVAC) system; lightning protection, grounding, and any other components necessary for a completely integrated communication building. Ensure that the shelter is constructed and installed according to local building codes.

Provide a shelter designed to withstand loads as follows: wind: 150 MPH; floor: 200 lbs. per square foot; slab: 200 lbs. per square foot; roof: 100 lbs. per square foot. Submit design drawings that meet all minimum design standards and are signed and sealed by a registered Professional Engineer in the State of Florida.

The shelter's exterior shall have an exposed concrete aggregate finish. The shelter must have a bullet-resistant exterior surface in accordance with UL 752. The shelter's exterior color is to be earth tone. Alternative exterior finishes or colors may be approved by the Engineer.

Ensure that the equipment shelter's heat transfer coefficient does not exceed 0.07 British Thermal Units (BTUs) per hour per square foot per degree Fahrenheit (F) for the roof and 0.28 BTUs per hour per square foot per degree F for the exterior wall.

677-2.2 Shelter Floor and Foundation: The floor is to be constructed of concrete or concrete composite material.

The foundation is a monolithic slab with appropriate footings and the final top of slab elevation is set a minimum of 2 feet above final grade, or as shown in the Plans. Concrete is to be Class I for extremely aggressive environments and in accordance with Section 346. Perform concrete structures work in accordance with Section 400.

The equipment shelter must not bend or break during moving, towing, or hoisting.

The equipment room's interior floor covering is to be industrial-grade vinyl flooring fastened to the shelter floor with waterproof adhesive. Provide an air gap between the equipment shelter floor and the foundation slab, or alternatively, construct the foundation slab with a vapor barrier to prevent moisture penetration. Insulate the floor to provide a minimum insulating factor of R-11.

677-2.3 Door: The exterior door is to be 36 inches wide by 78 inches tall, insulated, bullet-resistant, corrosion-resistant steel door with a door check and doorstop secured with a mortised deadbolt security lock keyed as directed. The door is to have a lever type handle on both the inside and outside. Provide the Department with four keys to each door lock.

677-2.4 Walls: Vapor shield the walls to prevent moisture penetration and insulate the walls for a minimum insulating factor of R-14. Interior surfaces are to have a white textured finish wall covering with molding on all corners. All floor/wall intersections are to have 4 inch vinyl baseboards installed using waterproof adhesive.

677-2.5 Ceiling and Roof: The interior room height is to be no less than 8 feet above the floor and capable of supporting the proposed electrical fixtures and cable trays. The roof section shall have a 1/8 inch per foot minimum pitch for drainage. Fill all voids between the ceiling and roof with a vapor shield and minimum Type R-21 insulation.

677-2.6 Entrance: The entrance steps shall be concrete with ADA approved hand rail. The maximum distance from the final grade or final step to the shelter floor must not exceed 8 inches.

677-2.7 Lighting: Fluorescent light fixtures are to provide a uniform initial light level of 125 to 150 foot candles at 4 feet above the floor with a 3:1 ratio of maximum to minimum light levels as measured throughout the shelter's interior. Mount a light switch inside the shelter, adjacent to the entry door, for the interior lighting.

Install one 2250 lumen floodlight that is vandal resistant and mounted on the outside near the entrance door with a photocell and interior light switch. Install an auxiliary powered interior emergency light that illuminates when primary power fails.

677-2.8 HVAC System: Install appropriately sized exterior wall-mounted air conditioners. Ensure the system has a dry contact closure alarm output for failure monitoring and has an installed adjustable start time delay, initially set to 5 minutes.

The HVAC unit must be capable of operating when the outside temperature falls below 60ºF and have sufficient capacity to cool from a 95ºF ambient temperature to 75ºF, including the equipment heat load, providing continuous interior equipment cooling and dehumidification. The unit shall have a device installed to reduce the starting current required during a cold start or under high-head pressure conditions.

Provide an IP addressable thermostat which provides a secure web based interface that displays the current thermostat settings and allows remote adjustments.

677-2.9 Cable Trays: Cable trays are to be 12 inches wide capable of supporting the transmission lines, control and data wires, and alarm wires associated with communication equipment. Use cable trays constructed of aluminum or painted steel fabricated in an open ladder type arrangement that are suspended from the ceiling. Electrically bond by mechanical means, on non-painted surface areas, all rack and cable tray units together. After bonding all rack and cable tray units, cover these areas with an antioxidant compound. Cable trays and rack frames are to be connected to the shelter interior ground.

The clearance height between the floor and bottom of the cable tray is to be no less than 86 inches.

Equip the cable trays with overhead receptacles as shown in the Plans.

677-2.10 Equipment Rack: Include at least one standard 19 inch EIA/TIA equipment rack capable of mounting and supporting all devices indicated in the Plans. Include provisions for vertical and horizontal cable management and for power strips. Secure the top of each rack to the cable tray above using C channel or J hook hardware and to the floor in the location shown in the Plans or as directed by the Engineer.

677-2.11 Fire/Smoke Detection and Suppression: Install at least one smoke detector that operates on alternating current. Mount the smoke detector on the ceiling 1 foot clear of all obstructions and ensure that it includes a dry contact closure that will activate during prescribed conditions.

Where the equipment shelter is to be furnished with an automatic fire protection system, it is to be an FM-200 waterless, residue-free fire suppression system that conforms to NFPA and ISO 14520 standards.

Mount a hand-held carbon dioxide ABC fire extinguisher on the wall near the door. Verify that the extinguisher has a valid inspection tag and is rechargeable.

677-2.12 Alarm Specification: Wire, label and terminate all alarms on a Type 66 block. Provide the following shelter alarms:

1. A magnetic dry contact door alarm.
2. A dry contact air conditioner failure alarm for each installed unit.
3. Dry contact fire alarms.
4. Dry contact high- and low-temperature alarms with thresholds adjustable between 50 and 90ºF.
5. A power failure alarm that is wired from a dedicated circuit breaker.
6. A main fuse alarm that is wired from the main fuse disconnect.

Provide provisions on each exterior side of the shelter that can be used for installation of security cameras. Provide these weatherproof conduit entries at locations near the corner of the shelter just below the roofline to allow wiring for cameras and other security devices to pass into the shelter.

677-2.13 Electrical: The standard electrical configuration is single-phase 120/240 V_{AC} at 60 Hz with a 150 A minimum service and a 42 circuit distribution panel. Provide power service drop and site-specific power needs in accordance with Section 639.

677-2.13.1 Primary AC Surge Protective Device: Install a primary AC surge protective device (SPD) that meets the requirements of Section 620, wired to protect the system while utilizing either utility or emergency power.

677-2.13.2 SPDs at Point of Use: Install SPDs that meet the requirements in Section 620 so that all outlets are protected.

677-2.14 Communication Cable Wall Entry: Install four, 4 inch diameter exterior wall penetrations with weather-sealed boots as shown in the Plans.

677-2.15 Circuit Termination Backboard: Install a backboard for the termination of communication circuits of 3/4 inch AC-grade plywood no less than 48 inches square and painted with two coats of gray, flame-retardant paint. All ground wires and conductors are to be insulated from the backboard, which must be securely mounted to the wall and capable of supporting the hardware fastened to it.

677-2.16 Warranty: The equipment shelter, its components, and hardware must have a manufacturer's warranty covering defects for a minimum of one year.

677-3 Installation Requirements.

677-3.1 General: Provide and detail the equipment shelter installation, including site layout, fencing, and all other features. Submit this drawing for approval prior to the start of construction.

Concrete is to be Class I in accordance with Section 346. Perform concrete structures work in accordance with Section 400. Obtain precast products from a plant that is currently on the Department's Production Facility Listing. Producers seeking inclusion on the list shall meet the requirements of Section 105. Submit to the Engineer all permit documents for approval prior to starting the work.

677-3.2 Electrical: Install and connect electrical power to the equipment shelter and install all wires and cables in a neat, orderly fashion. Provide underground power service unless otherwise specified in the Plans.

Make all electrical connections from the service drop to the equipment shelter's receptacles. Use a minimum of No. 12 AWG copper wires to install the receptacles, switches, and light fixtures. Run all wire in a minimum 0.75 inch inside diameter electrical metallic conduit. Divide the electrical loads among as many load centers as necessary to contain the quantity of circuit breakers required to protect the equipment shelter facility.

Load centers must contain separate, appropriately sized circuit breakers for the HVAC units, each major branch as is necessary, each receptacle, and each remaining location in the 42 circuit panel. Each interior side of the four walls will have a duplex receptacle 18 inches above the floor, or as shown in the Plans. Protect receptacles with an individual 20 A circuit breaker. Install a separate 20 A single-pole circuit breaker to protect the lighting circuits.

677-3.3 Provision for Backup Power: The equipment shelter must be capable of utilizing a mobile emergency generator during power outages. The emergency generator connection shall allow Department personnel to power the site from a portable generator in the event that both the utility power and emergency power is lost.

Install a primary power switch to allow for the disconnection of commercial power at the main power entrance that is interconnected to an automatic transfer switch to facilitate a switch to emergency generator power in the event utility power is lost. Emergency generator power must route through a manual power switch on the outside of the shelter prior to connection to the automatic transfer switch panel.

677-3.4 Grounding: Meet the requirements of Section 620.

677-3.5 Site Preparation: Meet the requirements of Section 110. Coordinate the extent and schedule for all land clearing activities with the Engineer.

677-3.6 Fencing: Furnish Type B chain-link perimeter fencing and gates according to the requirements of Section 550 and Design Standards, Index No. 802 with barbed wire attachment. Install the fence to form a rectangle or square shape, unless otherwise specified in the Plans. Allow for a minimum clearance of 5 feet between the fence and any enclosed item.

Construct sliding gates in accordance with Design Standards, Index No. 803 with barbed wire, configure as shown in the Plans. Provide a hardened, four digit combination gate lock with the combination set as directed.

677-3.7 Weed Prevention: As necessary, treat the fenced area with a Department-approved herbicide used in accordance with 7-1. Install a woven plastic weed barrier in accordance with manufacturer's recommendations prior to gravel installation with a minimum 10% overlap for each barrier section and secure the edges of the mat with stakes.

677-3.8 Compound Gravel: Place gravel or crushed rock covering all unimproved areas within the limits of the fenced area to a depth of 6 inches. Gravel or crushed rock shall not exceed 3 inches in diameter.

677-3.9 Site Restoration: Provide performance turf in accordance with Section 570.

677-4 Inspection and Verification.

677-4.1 General: The Department may perform an inspection witnessed by the Engineer at completion of the work. Notify the Engineer at least 10 days prior to completion of the installation to schedule the inspection. The inspection will verify that all equipment is correctly installed and functional.

Submit all test results in a format approved by the Engineer prior to testing. All recorded test report data shall be signed and dated, witnessed, and validated by signature from a Department representative. Remedy all noted deficiencies at no cost to the Department.

677-4.2 Mechanical Inspection: Test all equipment associated with the shelter. Test and verify the HVAC system performance for heating, cooling, and dehumidification. Inspect the building for the proper sealing of all wall penetrations. Correct any deficiencies at no cost to the Department.

677-4.3 Electrical Inspection: Verify and submit a report to the Engineer prior to acceptance that all shelter lights and smoke detectors operate properly, and proper electrical power load balances are realized. Correct any deficiencies at no cost to the Department.

677-4.4 Site Inspection: The site is to be free of debris and all excavations backfilled and restored to natural grade conditions.

677-4.5 Performance Period: Following the completion of all acceptance testing and inspections, subject the installed site to a minimum 20 day performance period, or alternately, the operational test period for the project, whichever is greater.

For the purpose of a successful performance period, failure of operation is defined as the failure of a major site component (i.e., HVAC systems, lighting, alarms, fire or smoke detection, etc.). Conduct the performance verification inspection with the Engineer present.

Complete performance testing within 45 days of shelter installation and inspection.

677-5 Method of Measurement.

The Contract unit price for each equipment shelter, furnished and installed, will include furnishing, placement, and testing of the shelter, all its materials and equipment, and for all tools, labor, equipment, hardware, site preparation, site restoration, fencing, supplies, shop drawings, permit documents, utility connections, documentation, and incidentals necessary to complete the work.

677-6 Basis of Payment.

Price and payment will be full compensation for all work specified in this Section.

Payment will be made under:

Item No. 677-1 Equipment Shelter, per each.