Special Specification 6132
Satellite Building

1. DESCRIPTION

Furnish and install a precast satellite building as shown on the plans, as detailed in this Special Specification, and as directed. The satellite building will house the various equipment required for the Intelligent Transportation Systems (ITS).

2. MATERIALS

Furnish only new materials in accordance with the details shown on the plans, the requirements of this Item, and the requirements of the following Items:

- Item 421, "Hydraulic Cement Concrete"
- Item 432, "Riprap"
- Item 440, "Reinforcement for Concrete"
- Item 442, "Metal for Structures"
- Item 445, "Galvanizing"
- Item 618, "Conduit"
- Item 620, "Electrical Conductors"
- Item 656, "Foundations for Traffic Control Devices"

2.1. **Precast Concrete Building.** Furnish a complete weatherproofed, secure, fire resistant, bullet resistant, and maintenance-free precast concrete building.

Ensure the building meets the code ACI-318-83, "Building Code Requirements for Reinforced Concrete."

2.1.1. **Design Loads.**

- Wind loading – 140 mph (ASCE 7-02, Category II, Exposure C, Enclosed Building)
- Roof live load – 60 psf
- Floor live load – 250 psf
- Seismic design category "D", seismic use group I

2.1.2. **Precast Concrete Wall Panels.** Furnish lightweight precast reinforced concrete panels meeting a compressive strength of 6,000 psi at 28 days. Furnish 4 in. thick minimum panels that meet UL 752 Test Method Level 4 for bullet resistance.

Provide enough openings for conduits, as shown on the plans, to enter the building without drilling.

Provide a smooth finish on all panel surfaces.

2.1.3. **Panel Connections.** Provide steel bracket connections made of structural quality, hot-rolled carbon meeting ASTM A36 and hot dipped galvanized in accordance with Item 445. Provide 1/2 in. diameter fasteners that meet ASTM A307 for low-carbon steels bolts. Secure all inserts for corner connections directly to form before casting panels. Floating of connection inserts will not be allowed.

2.1.4. **Door.** Provide door of the size shown on the plans. Provide bullet resistant, insulated 18 gauge steel door with three tamper-proof hinges, drip cap, and weather stripping. The locking mechanism will be a three point stainless latch system designed for padlock. The door will be capable of being opened from the inside when the door has been closed and latched from outside the building. Provide stainless steel hinges having a five

knuckle ball bearing with non-removable pins; extruded aluminum threshold with neoprene seal; and aluminum drip cap with stainless steel screws.

Provide door with a compressible weather-stripping to create a dust free environment for sensitive equipment.

Clean and chemically treat the door to insure a maximum paint adhesion. Ensure that all surfaces of the door and frame exposed to view have a factory applied coat of rust inhibiting primer, either air-dried or baked-on. Ensure the finish meets the requirements for acceptance stated in ANSI/SDI A250.10 “Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.” Paint door to match interior and exterior.

2.1.5. **Fasteners.** Ensure that all screws, nuts, and locking washers exposed to weather are stainless steel.

2.1.6. **Roof.** Provide a precast post-tensioned roof panel meeting the design of the precast building. Ensure the roof panel is 4 in. thick and slopes from front to back. Extend the roof a minimum of 3 in. beyond the wall panel on each side and have a turn down design, which extends 1/2 in. below the top edge of the wall panels to prevent water migration into the building along the top of wall panels. Ensure roof slab has a smooth finished edge.

2.1.7. **Floor.** Provide a precast post-tensioned floor slab with a compressive strength of 6,000 psi at 28 days. Ensure the concrete floor slab is 4 in. thick and have reinforcing steel, Grade 60, meeting ASTM A615. The precast concrete floor slab must fit the precast concrete building. The outside edge of the concrete floor slab will have a 1/2 in. deep recess where the width of the wall panels will cast into the floor. The 1/2 in. recess makes the interior floor surface 1/2 in. higher than the joint between the wall panel and floor slab preventing intrusion of water.

2.1.7.1. **Access Flooring.** Furnish and install a complete access flooring system including, but not necessarily limited to the support system, removable floor panels, stringers, perforated panels, and system grounding.

The access flooring system consists of an elevated pedestal and frame grid with rigid floor panels, complete with accessories. Mount the elevated floor 9 in. above the pit floor. Support the floor panels with stringers.

Provide a lift-out elevated floor system manufactured by USG Interiors, Inc., Access Floor Systems, Floating Floors, Inc., or approved equal.

Floor Panels. Provide 24 x 24 in. floor panels, capable of withstanding a uniform live load of 250 psf with a maximum deflection of .04 in. A concentrated load of 1000 lb. on 1 sq. in. must be supported in any location with a maximum deflection of 0.10 in. A maximum permanent deflection of 0.01 in. is allowable at design load. Ultimate strength must not be less than twice the design strength. Maximum electrical resistance must be 10 ohms from the top of the panel, less wear surface, to the pedestal base. Components must have positive contact for safe, continuous electrical grounding of entire floor system.

Ensure that each floor panel is of welded steel construction utilizing a 24 in. steel top sheet welded to a formed steel bottom pan. Ensure that the complete assembly is painted light grey and filled internally with a cementitious core material. Cover the floor with gray static dissipative tile suitable for computer room application, 1/8 in. thick or as directed by the Engineer. Use a moisture resistant electrically conductive floor finish adhesive of the type recommended by the floor finish manufacturer.

Provide two floor panel lifting devices, of the manufacturer's standard type recommended for each panel type.

Ensure the perforated floor panels have the same surface sheet material and size, and meet the same structural requirement as the floor panels. Each perforated panel must have an integral damper assembly and a minimum of 25% free area for air flow.

Provide solid copper grounding connectors.

To protect cable openings install extruded polyvinyl chloride or self extinguishing neoprene edging with 3/8 in. thick closed cell neoprene sheet.

Provide manufactured floor panels within the following tolerances:

- Flatness: ± 0.03 in. in any direction
- Length: ± 0.010 in.
- Squareness: ± 0.015 in. in diagonal dimension

Pedestals. Ensure pedestals have an axial load capacity of 5000 lb., without permanent deformation. Ultimate strength will not be less than twice the design strength. Provide galvanized steel pedestals with 16 sq. in. galvanized steel flat bottom base plate, threaded supporting rod, and a vibration-proof lock nut to permit 1-1/2 in. adjustment.

Lateral Stability. Ensure the system is laterally stable in all directions with or without panels in place.

Stringers. Provide galvanized steel stringers capable of supporting a 250 lb. load on 1 sq. in. at the center of a 21-1/8 in. span with a permanent set not to exceed 0.010 in.

Installation. Install the floor system in accordance with manufacturer's instructions, by an authorized and approved representative of the manufacturer in the following sequence:

- Secure pedestals to the subfloor with adhesive.
- Install additional pedestals where the grid pattern is interrupted and at cutouts.
- Install floor panels solidly on pedestals with a maximum out-of-level tolerance of 1/16 in. in 10 ft.
- Make allowances to install the perforated panels with integral damper assemblies.
- Seal field cuts in floor panels with plastic angles or channels.
- Ground to earth the entire access floor assembly.
- Provide, by the access flooring manufacturer, two (2) 120 VAC fan units.

2.1.8. **Post-tensioning Strand.** Ensure the post-tensioning strands are 41K Polystrand CP50, 1/2 in., 270 KSI, 7 wire strand, greased plastic sheath, (ASTM A416). The roof and floor must each be post-tensioned by a single, continuous tendon. Grease and enclose tendons within a sheath.

2.1.9. **Caulking and Sealing.** Provide closed cell polyurethane backer rod and low-modulus sealant designed for exterior joint of precast concrete panel joints.

2.1.10. **Lifting Devices.** Provide lifting devices integrated with the structure. Furnish at least 4 lifting devices or as per manufacturer's recommendation. Provide stainless steel or galvanized metal lifting devices to prevent rust staining on structure.

2.2. **Framing and Insulation.** Attach 3.5 in. metal studs to the interior of the walls on 24 in. centers. Place 4 in. thick fiberglass batts between the studs and cover studs with 3/4 in. plywood. Cover plywood with 3/4 in. fiberglass reinforced panels, laminated with trim on all joints and corners, or as directed by the Engineer.

2.3. **Foundation.** Include the building foundation as part of this bid Item. Mount the building on the concrete foundation as shown in the plans. Construct the foundation in accordance with Article 656.3., "Construction." Ground the building to a 5/8 in. (minimum) copper clad ground rod(s) 8 ft. long driven into the ground and installed in the foundation. Coordinate the location(s) of ground rod(s) with the Engineer.

2.4. **Fence and Gate.** Furnish and install a 9 gauge galvanized hot dipped fence with weaving (2 oz/sf) 2 in. mesh, 8 ft. height with three strand 12 gauge double twisted 4 point barbed wire, 4 in. OD galvanized gate post with caps, 1.9 in. OD galvanized line post, 2.375 in. OD galvanized corner post, and 7 gauge top and bottom tension wire. Space posts at 10 ft. on center.

Furnish and install a double gate for a 6 ft. total width opening, 8 ft. height with 3 strands of barbed wire, locking hardware, supporting hardware, and frame.

2.5. **Riprap.** Include the riprap as part of this bid Item. Furnish and install riprap in accordance with Item 432.

3. ELECTRICAL REQUIREMENTS

The electrical system will consist of 200 Amp 120/240 VAC service, with the following components:

- Distribution panel, 200 Amp, 120/240 VAC, main 30 position.
- Distribution panel, 100 Amp, 120/240 VAC, main 20 position for UPS.
- One power entrance elbow, sized to electrical service.
- Thirty single pole 20 Amp breakers furnished.
- UPS outlets, UPS outlets with isolated ground, utility outlets.
- Air conditioner wiring.
- Two rows of 4 ft. fluorescent lights (2 bulb, 40W), with wireguard at a maximum spacing of 2 ft. between lights along the longest dimension of the building.
- Ground lead from distribution panel to building skid conduit.

All electrical installations will be in conformance with the latest edition of the National Electrical Code. All equipment will be U.L. Listed or equivalent.

All conduit will be surface mounted EMT.

All wiring will be type THHN.

The locations of main switches, cabinets, light outlets and receptacles are indicated on the floor plans. These plans are not intended to give complete details in regard to location of conduit, etc.; exact locations are to be determined by actual measurements at the building and are to be subject to the approval of the Engineer.

3.1. **Receptacles and Outlets.** Install a metal outlet box of a suitable style for every switch, ceiling outlet, or other outlets as shown on the plans. Secure all outlets rigidly in place by approved methods. Provide outlets intended for fixtures with fixture studs. Mount base receptacles and wall switches in compliance with the American Disabilities Act (ADA).

Place receptacles and light outlets so as not to interfere with the other work. Center the ceiling outlets with regard to ceiling panels, etc. Failure to observe the above mentioned condition will require the Contractor to correct any outlet improperly installed at the Contractor's expense.

Install receptacles as shown on the plans. Provide circuit breaker protection to all receptacles. Provide NEMA type 5-20R receptacle for the electronic equipment receptacles or as required to match electronic equipment plugs. Provide NEMA type 5-20R receptacle for the convenience outlets and ground fault circuit interrupter protection. Provide NEMA type 6-30R receptacle for the air conditioning and heating receptacle as required to match the air conditioning and heating equipment. Ensure receptacles and switches from the "UPS" are orange color.

3.2. **Uninterruptible Power Supply Switch**. Supply a switching mechanism for connection of the UPS. Provide a switch that automatically switches the designated building power loads from line power to UPS power in the event of power failure. Ensure the switch returns the power loads to line power upon restoration of line power. Provide a switch of sufficient capacity to allow switching from incoming line power to UPS power at full load without any disruption of power and allows manual switching from line power to UPS power.

3.3. **Telephone Jack.** Install a minimum of 3 RJ-11 modular phone jacks in the Satellite Buildings. Make all necessary arrangements with the local phone company to provide a telephone line. Enclose the telephone conductors in conduit.

3.4. **Outdoor Lighting.** Furnish and install an LED light, 100W high pressure sodium light equivalent, 120 VAC, with fixture suitable for outdoor installation at each corner of the building (four lights and fixtures total) as shown on the plans and as directed by the Engineer.

3.5. **Grounding and Lightning Protection.** Provide grounding wire conductor runs as short and straight as possible. Ensure that all equipment and bonding grounding conductors have radii bends of 8 in. or greater.

Locate in close proximity the AC service entrance and the telephone line entry in close proximity where practical and bond together their respective grounding systems.

4. HVAC SYSTEM

Furnish and install a thru-wall air conditioning with heat unit as shown on the plans. Provide unit of 8,000 BTU minimum, programmable, variable speed fan, and accessories.

Furnish and install an anti-vandalism/theft protection cage, thru bolted to the building wall with tamper-resistant bolts. Provide cage with a padlockable access door to allow servicing. Attach security bars to the exterior of the building, as recommended by the manufacturer, with tamper resistant fasteners. Fabricate the bars from A36 steel, galvanized, and painted to match the exterior of the building.

5. SAFETY AND SECURITY

5.1. **Alarm System.** Furnish and install one smoke detector, either ionization or photoelectric with remote alarm contacts (dry contacts) within the building.

Furnish and install a high temperature alarm with adjustable range from 110°F to 30°F and a low temperature alarm with adjustable range from 30°F to 110°F that can be wired for normally open or closed dry contact.

Furnish and install an intrusion alarm to monitor door entry through a dry contact and wired for either normally open or closed. Provide the alarm system with a motion sensor and a numeric keypad containing an LCD readout showing alarm status. Mount the numeric keypad on the inside wall of the building, near the entry door. Install weatherproof electronic siren on the outside of the building. Provide the alarm system with an automatic dialing feature for reporting system status and alarm conditions to a monitoring site. Ensure the system is programmed to automatically report via a dial up telephone line to a monitoring site specified by the Engineer. Provide an alarm system that operates 120 VAC and have a backup battery feature installed. Enclose the alarm control module and circuitry and battery backup in a key lockable wall mounted enclosure mounted on the inside wall of the building. Provide two keys for the enclosure.

Ensure the alarm system monitors the detectors through the use of zones. Provide a minimum of six detection zones. Ensure the zone covering the entry door has a programmable delay feature that is programmable via the numeric keypad and it is adjustable from 0 seconds to 2 minutes. Ensure the alarm system has a programmable security access code. Assign one detection zone to monitor smoke detectors. Ensure detection of a smoke or fire condition causes a different alarm to sound at the siren and at the remote monitoring site.

5.2. **Safety Items.** Furnish two hand held fire extinguishers, U.L. rated and of either carbon dioxide, dry chemical or Halon 1211.

6. CONSTRUCTION

6.1. **General.** The Engineer may shift the satellite building location where necessary to secure a more desirable location or to avoid conflicts with utilities. Use established industry and utility safety practices when working near underground or overhead utilities. Consult the appropriate utility prior to beginning work.

Obtain all required permits for the construction of this work.

Grade terrain as shown on the plans.

Construct the foundation as shown on the plans and in accordance with Article 656.3., "Construction."

Install conduits and conductors in accordance with Item 618, "Conduit," and Item 620, "Electrical Conductors."

Inspect the precast building upon delivery for physical damage and ensure that it is free from cracks, dents, missing components, etc. Repair or replaced damaged items to the satisfaction of the Engineer prior to installation.

Install the satellite building in accordance with the approved shop drawings and per manufacturer's recommendation.

Install electrical items in accordance with the National Electrical Code.

Install fence and gates as shown on the plans.

Construct riprap as shown on the plans and in accordance with Item 432, "Riprap."

6.2. **Submittals.** Submit the following documentation to the Engineer for review and approval prior to any components or materials being ordered:

- Four (4) copies of shop drawings, catalog cut sheets, data sheets, and design calculations for the satellite building.
- Four (4) copies of shop drawings and product data of the access floor system. Indicate on the drawings the layout, interruptions to the grid, special sized panels required, panel drilled or cut-out for services, appurtenances or interruptions, edge details, perforated panels, manufacturer's installation instructions along with the manufacturer's certification that the system meets specified design strengths and electrical resistance.
- Four (4) copies of the proposed electrical plan. Indicate on the plan, as a minimum, placement of all switches, outlets, receptacles and lighting and the items protected by the UPS.
- Four (4) copies of the shop drawings for the fence and gate. Ensure the fence and gate materials comply with FED Spec RR-F-191/3D.

6.3. **Documentation.** Provide the satellite building with the following documentation:

- Four (4) complete and accurate building wiring diagrams.
- Four (4) complete and accurate building fabrication plans including floor plan, elevation, and electrical details.
- Document every wire harness termination in the building on the wiring diagrams. Provide updated drawings if any discrepancies are discovered. Prior to final acceptance of a building, provide a reproducible tracing of the building wiring diagrams.
- Place one (1) set of the documentation in the building in a heavy plastic envelope approved by the Engineer. Deliver the other documentation to the Engineer.

6.4. **Testing.** Perform testing in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance and Warranty."

6.5. **Warranty.** Provide warranty in accordance with Special Specification 6005, "Testing, Training, Documentation, Final Acceptance and Warranty."

7. MEASUREMENT

This Item will be measured as each satellite building, constructed, complete in place, and tested.

8. PAYMENT

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Satellite Building." This price is full compensation for preparing and grading the area where the building is going to be installed; for fabricating, delivering, and installing the satellite building; for the foundation; for the equipment described under this item with cables and connectors; for conduits and conductors; for fence and gate; for riprap; all labor, materials, tools, equipment, documentation, incidentals, and services necessary to complete the work.