

EXHIBIT A

FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL SPECIFICATIONS

FOR

COMMUNICATIONS FACILITIES CONSTRUCTION NEAR D5 RTMC

January 30, 2018

FLORIDA DEPARTMENT OF TRANSPORTATION

COMMUNICATIONS FACILITIES INSTALLATION NEAR D5 RTMC

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1. PROJECT SCOPE

1.1 General

This document provides technical specifications and delineates the requirements for installing a communications site compound, tower, shelter, DC power distribution system, and emergency power system at a new District 5 site. The tower will link the new RTMC supporting District 5 to the Statewide ITS Communications Network (SICN).

Elements of the project include:

- Submit proposed transportation Temporary Traffic Control (TTC) plans for review and approval of the FDOT.
- Submit proposed site compound excavation/grading construction design plans for review and approval of the FDOT.
- Submit proposed tower and foundation structural analysis and structure assembly design plans for review and approval of the FDOT.
- Submit proposed tower lighting, and grounding systems installation design plans for review and approval of the FDOT.
- Obtain required building permits and coordinate all FAA and FCC filings.
- Furnish and install the concrete drilled pier tower foundations.
- Furnish and erect the 250-foot self-supporting tower.
- Furnish and install tower obstruction lighting system, and exterior grounding systems.
- Furnish and install equipment shelter and power system.
- Furnish and install commercial AC power service.
- Furnish and install tower and shelter ground system.
- Backfill holes, grade, and apply grass sod to compound.
- Furnish and install new fencing, weed prevention material, and gravel to the site compound.
- Dispose of all material and debris.
- Inspect all installation work.
- Testing of new facilities.
- Final acceptance inspection.
- Entire job shall be in accordance with the Contract Plans.

1.2 Conduct of Work

The successful bidder (hereafter "Vendor") shall arrange with the FDOT for access to the site and work areas. The Vendor shall provide security for his/her equipment as required by the FDOT, and shall conduct operations so as to avoid interference with the FDOT's normal operations.

Before ordering materials or doing work that is dependent for proper size or installation job conditions, the Vendor shall verify all dimensions by taking measurements at the site and shall be responsible for the correctness of same. No consideration will be given to any claim based on the difference between the actual dimensions and those indicated on the drawings. Any discrepancies between the drawings and/or specifications and the existing conditions shall be referred to the FDOT Project Manager for adjustment before any work affected thereby is begun.

Work to be performed outside of these specifications shall be referred to as "By others", or if by the State of Florida's designated representative then "By FDOT". The Vendor shall be responsible for coordinating work with "others" or FDOT wherever an interface is required.

1.3 Drawings and Project Plans

The drawings and project plans are typically diagrammatic. They are as accurate as scale permits and the Vendor shall follow them as closely as possible. Any field conditions that change the required installation shall be reported to the FDOT. The Vendor shall verify all conditions and measurements relating to the work in the field prior to proceeding with installation. All offsets required for installation of cabling and wiring systems shall be included in this project at no additional cost to the FDOT. The Vendor shall coordinate any modifications required by existing conditions to avoid conflicts of building systems and other building components.

The drawings, project plans, and specifications are complementary, and any work required by one and not the other shall be considered to be required by both. The FDOT Project Manager shall be the sole interpreter of the drawings and specifications.

The Vendor shall note that all drawings and details are diagrammatic in general and indicate the character of the work included. Work intended, but having minor details

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obviously omitted or not shown, shall be furnished and installed complete to perform the functions desired.

1.4 Definitions

Department:	The Purchaser (or Owner) State of Florida Florida Department of Transportation (FDOT) Contact Person is the FDOT Project Manager (see below) in Tallahassee, Florida
Vendor:	The individual, firm, partnership, corporation, company, association, or other legal entity to whom the contract is awarded by the FDOT and who is subject to the terms thereof.
Vendor Project Manager	The Vendor's project contact person who has the project responsibility.
FDOT Project Manager:	Randy Pierce FDOT Traffic Engineering and Operations – TSM&O Section 605 Suwannee Street, MS 90 Tallahassee, Florida 32399-0450 V: (850) 410-5608, F: (850) 410-5501 randy.pierce@dot.state.fl.us
Project Consultant:	Danielle Morales, PE Atkins North America 605 Suwannee Street, MS 90 Tallahassee, Florida 32399-0450 V: (850) 410-5617, F: (850) 410-5501 Danielle.Morales@dot.state.fl.us

1.5 Acronyms and Abbreviations

°F	Degrees Fahrenheit
A	Ampere
AC	Alternating Current

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AGL	Above Ground Level
AIA	American Institute of Architects
AIC	Ampere of Interrupt Current
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
ATS	Automatic Transfer Switch
AWG	American Wire Gauge
BTU	British Thermal Unit
D5	District 5 (Florida Department of Transportation)
EIA	Electronic Industries Alliance
EMT	Electrical Metallic Tubing
IEC	International Electrotechnical Committee
IEEE	Institute of Electrical and Electronics Engineers
FDLE	Florida Department of Law Enforcement
FDOT	Florida Department of Transportation
FHP	Florida Highway Patrol
Hz	Hertz
KA	Kiloamp
KHz	Kilohertz
KW	Kilowatt
LPI	Lightning Protection Institute
MG	Motors and Generators (Used by NEMA for Standards)
MHz	Megahertz
mm	Millimeter
MOV	Metal Oxide Varistor
MTS	Manual Transfer Switch

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MUTCD	Manual on Uniform Traffic Control Devices
NAD 83	North American Datum, 1983
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NTP	Notice-to-Proceed
PM	Vendor's Project Manager
RPM	Revolutions Per Minute
RTMC	Regional Traffic Management Center
SAD	Silicon Avalanche Diode
SICN	Statewide ITS Communications Network
SNMP	Simple Network Management Protocol
SPD	Surge Protective Device
UL	Underwriters Laboratory
V	Volt
VAC	Volts, Alternating Current
VDC	Volts, Direct Current
WGS 84	World Geodetic System, 1984

1.6 Applicable Publications and Standards

The following publications and standards of the latest issue on the date, unless otherwise specified, of the Request for Proposal shall be part of this specification. In the event of inconsistencies between this specification and these publications and standards, the requirements of this specification shall take precedence.

1.6.1 Shelter and Tower

- A. Florida Building Code, 2017 Edition.

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- B. ANSI/TIA-222-G-4: Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Structures
- C. Local Jurisdictional Building Codes
- D. ASCE-7: Structural and Wind Loading Standards
- E. ASTM A123: Standard Specification for: Zinc (Hot Galvanized) coatings on products fabricated from rolled, pressed, and forged steel shapes, plates, bars, and strip.
- F. ASTM A153: Standard Specification for: Zinc coating (hot-dip) on iron and steel hardware.
- G. IEEE Std 81-2012: IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.
- H. Flammable and Combustible Liquids Code (NFPA 30), 2018 Edition.
- I. Florida Department of Transportation FY 2017-18 Design Standards.
- J. Florida Department of Transportation 2017 Standard Specifications for Road and Bridge Design.
- K. Florida Statutes, 2017, Section 471
- L. IEEE C62.33-1982 (Reaff 1994): Standard Test Specifications for Varistor Surge-Protective Devices (ANSI).
- M. IEEE C62.35-2010: Standard Test Specifications for Avalanche Junction Semiconductor Surge-Protective Devices (ANSI).
- N. IEEE C62.41-1991 (Reaff 1995): Recommended Practice on Surge Voltages in Low-Voltage Data, Communications, and Signaling Circuits.
- O. Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition, with Revision Numbers 1 and 2 Incorporated, dated May 2012.
- P. National Electrical Code (NEC) (NFPA 70), 2017 Edition.

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- Q. UL 752: Standard for Bullet-Resistive Surfaces.
- R. UL 1562: Standard for Transformers, Distribution, Dry-Type - Over 600 Volts.
- S. Applicable Manufacturer's Instructions and Standard Practices.
- T. Applicable Occupational Safety and Health Administration Practices.

1.6.2 Engine Generator Standards and Codes

The generator set installation and on-site testing shall conform to the requirements of the following codes and standards, as applicable. The generator set shall include necessary features to meet the requirements of the following standards:

- A. CSA C22.2 No. 14-2013: Industrial Control Equipment
- B. CSA C282-15: Emergency Electrical Power Supply for Buildings
- C. EN 50082-2: Electromagnetic Compatibility – Generic Immunity Standard Part 2: Industrial Environment
- D. EN 55011:2016 - Industrial, Scientific and medical equipment. Radio-frequency disturbance characteristics. Limits and methods of measurement.
- E. IEC 8528 part 4: Control Systems for Generator Sets
- F. IEC Standards 801.2, 801.3, and 801.5 for susceptibility, conducted, and radiated electromagnetic emissions.
- G. IEEE 446 Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications FCC Part 15, Subpart B
- H. ISO 9001:2015 Quality Management System - Requirements
- I. NEMA MG1-2016 Section IV Part 32: Motors and Generators
 - o The alternator shall comply with the requirements of this standard.
- J. NFPA 58: Liquefied Petroleum Gas Code
- K. NFPA 70 National Electrical Code:

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- Equipment shall be suitable for use with systems in compliance with Articles 700, 701, and 702.
- L. NFPA 110: Standard for Emergency and Standby Power Systems
- M. UL 58: Standard for Steel Underground Tanks for Flammable and Combustible Liquids
- N. UL 508: Standard for Industrial Control Equipment
- O. UL 1236: Standard for Battery Chargers for charging Engine-Starter Batteries
- P. UL 2200: Standard for Stationary Engine Generator Assemblies

The generator set manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design, development, production, installation, and service in accordance with ISO 9001.

1.6.3 Automatic Transfer Switch Standards and Codes

The ATS shall conform to the requirements of the following codes and standards:

- A. CSA C22.2, No. 14 – 2013: Industrial Control Equipment
- B. CSA C282-15: Emergency Electrical Power Supply for Buildings.
- C. IEEE SA - C62.41-2002: IEEE Recommended Practice on Characterization of Surges in Low-Voltages (1000 V or less) AC Power Circuits
- D. IEEE SA - C62.45-2002: IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and less) AC Power Circuits
- E. NFPA 70: National Electrical Code
- F. NFPA 99: Health Care Facilities Code
- G. NFPA 110: Standard for Emergency and Standby Power Systems

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- H. IEEE SA – 446-1995: Recommended Practice for Emergency and Standby Power Systems Industrial and Commercial Applications
- I. NEMA ICS 10-2005 part 1: – Electromechanical AC Transfer Switch Equipment
- J. UL 508: Standard for Industrial Control Equipment
- K. UL 891: Switchboards
- L. UL1008: Transfer Switch Equipment
- M. The transfer switch manufacturer shall be certified to ISO 9001 International Quality Standard and shall have third party certification verifying quality assurance in design, development, production, installation, and service in accordance with ISO 9001.

1.7 Vendor's Responsibility

The Vendor is solely responsible for all designs, equipment, materials, and services proposed. Notwithstanding the details presented in these specifications, the Vendor is responsible for verifying the completeness of the materials required and suitability of devices to meet these specifications. The Vendor shall provide and install, without claim, any additional equipment required for operation in accordance with these specifications.

The Vendor shall provide competent, careful, and reliable superintendents, foremen, and workstaff. The Vendor shall provide a superintendant or foreman during all on site activities. The Vendor shall provide workstaff that shall make due and proper effort to execute the work in the manner prescribed by the contract documents, or FDOT may take action as prescribed below.

Whenever FDOT determines that any person employed by the Vendor is incompetent, disorderly, or insubordinate, FDOT will provide written notice and the Vendor shall discharge the person from the job site. The Vendor shall not employ any discharged person on the project without the written consent of FDOT. If the Vendor fails to remove such person or persons, FDOT may withhold payment of invoices or suspend work until the Vendor complies with such orders.

1.8 Authority to Suspend Vendor Operations

FDOT has the authority to suspend the Vendor's operations, wholly or in part. FDOT will order such suspension in writing, giving in detail the reasons for the suspension. Contract time will be charged during all suspensions of the Vendor's operations. FDOT may grant an extension of contract time when determined appropriate in FDOT's sole judgment.

No time extension will be granted to the Vendor when the operations are suspended for, including but not limited to, the following reasons:

1. The Vendor fails to comply with the contract documents.
2. The Vendor fails to carry out orders given by FDOT.
3. The Vendor causes conditions considered unfavorable for continuing the work.

The Vendor shall immediately comply with any suspension order. The Vendor shall not resume operations until authorized to do so by FDOT in writing. Any operations performed by the Vendor after the issuance of the suspension order, and prior to FDOT's authorization to resume operations, will be at no cost to FDOT, without regard to whether otherwise constructed in conformance with the provisions of the contract. Further, failure to immediately comply with any suspension order will also constitute an act of default by the Vendor and is deemed sufficient basis in and of itself for FDOT to declare the Vendor in default.

1.9 Subcontractors

If the Vendor intends to engage a subcontractor or subcontractors to provide any part of the equipment or Work required by the contract, the Vendor shall provide each subcontractor with a copy of this RFP to ensure the subcontractor's awareness and subsequent compliance with all pertinent requirements of the RFP.

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1.10 Compliance with Time Requirements

The Vendor shall commence work in accordance with the approved working schedule and provide sufficient labor, materials, and equipment to complete the work by April 30, 2019. Should the Vendor fail to furnish sufficient and suitable equipment, forces, and materials, as necessary to prosecute the work in accordance with the required schedule, FDOT may withhold payment or suspend work until the Vendor corrects such deficiencies.

1.11 Extension of Project Schedule

All facilities installation, removal, and disposal activities must be completed by April 30, 2019. Project extensions may be granted at the sole discretion of FDOT, and only if delays are experienced as a result of:

1. Actions taken by FDOT, or its agents, which are the sole cause for delay.
2. Changes ordered by FDOT, which are the sole cause for delay.
3. Road repairs, mishaps, strikes, Acts of War, Acts of God, riots, lockouts, or inclement weather which would delay equipment or limit access to any site at which Work will be required, if these events are the sole cause of the delay.

The Vendor shall not be entitled to any damages, of any nature or kind, for delays, regardless of cause or responsibility. Rather, the Vendor's sole remedy for delay shall be time, and then only as determined above.

1.12 Changes in Work

The FDOT may at any time, by written amendment to the contract, make changes within the general scope of the work, including, but not limited to, revisions, deletions or additions to portions of the work; or changes in the method of shipment or packaging and place of delivery, upon appropriate approvals as allowed by FDOT's procurement code.

If any change order initiated by the FDOT causes an increase or decrease in the cost or time required for the performance of any part of the work under the contract, an equitable

adjustment shall be made by the FDOT in the contract price or delivery schedule, or both, and the contract shall be modified in writing accordingly.

1.13 Payment Schedule

The Vendor will be paid on a lump sum basis for the successful completion and acceptance by the FDOT of the work associated with each project milestone. The request for payment for each milestone must be made through the Project Manager on approval of the milestone.

Payments made to the Vendor shall not be considered as evidence of satisfactory performance of the work by the Contractor, either in whole or in part, nor shall any payment be construed as acceptance by FDOT of defective work or inadequate services.

1.14 No Waiver of Contract

Changes made by the FDOT shall not be considered to waive any of the provisions of the contract, nor may the Vendor make any claim for loss of anticipated profits because of the changes, or by reason of any variation between the approximate quantities and the quantities of work actually performed. All work shall be performed as directed by the FDOT and in accordance with the contract documents.

1.15 Site Access and Security Requirements

The FDOT system addressed in this contract supports public safety applications such as Intelligent Transportation Systems (ITS), Highway Maintenance, and the Statewide Law Enforcement Radio System (SLERS). To ensure security for the system, FDOT requires that Vendor or Sub-Vendor employees submit to security background checks performed by the Florida Department of Law Enforcement after award of contract. A minimum of one Vendor or Sub-Vendor employee that possesses this clearance must be on site at all times, unless accompanied by an FDOT representative.

The Vendor shall be aware that the D5 RTMC is under construction on the south west side of the site. A new I-4 ramp is under construction on the east side of the site. The Vendor may be required to coordinate with District 5 and Other Vendors throughout the project in order to access the construction site.

1.16 Warranty

All equipment and services furnished by the Vendor as part of this project shall be warranted to be free from defects in material and workmanship, and shall conform to this specification. In the event any such defects in equipment or services become evident within the warranty period, the Vendor shall correct the defect by, at its option, (1) repairing any defective component of the equipment; (2) furnishing and installing necessary replacement parts; or (3) redoing the faulty services. The Vendor is responsible for all charges incurred in returning defective parts to the Vendor's, Sub-Vendor's, or suppliers' plants, and in shipping repaired or replacement parts to FDOT. The Vendor shall provide labor to perform warranty services at no charge to FDOT during the warranty period.

The Vendor further warrants that during the warranty period equipment furnished under this contract shall operate under normal use and services as a complete system, which shall perform in accordance with this specification.

The warranty period shall be a period of at least 12 months from the date of final systems acceptance as defined herein. Claims under any of the warranties herein are valid if made within 30 days after termination of the warranty period. In addition, the following specific requirements apply to the Vendor's warranty:

- All equipment furnished by the Vendor hereunder shall be new and of current manufacture.
- FDOT shall notify the Vendor within a reasonable time after the discovery of any failure or defect occurring within the warranty period.

Should the Vendor fail to remedy any failure or defect within 30 consecutive days after receipt of notice thereof, or within time specified in the notice, FDOT shall have the right to replace, repair, or otherwise remedy such failure or defect at the Vendor's expense.

The Vendor shall obtain any warranties which Sub-Vendors or suppliers give to the Vendor in the regular course of commercial practice, and shall apply the same to the benefit of the FDOT.

The warranty shall be comprehensive. No deductibles shall be allowed for travel time, service hours, repair parts cost, etc.

1.17 Material and Workmanship

All equipment and component parts furnished shall be new, meet or exceed the minimum requirements stated herein, and perform to manufacturer's specifications.

All parts shall be of high quality workmanship and utilize the most current technology available. No part or attachment shall be substituted or applied contrary to the manufacturer's recommendations and standard practices. At the time of delivery and installation, the most current revision model of each type of equipment meeting or exceeding the requirements of this contract shall be provided, regardless of the model offered in the proposal.

1.18 Progress Reporting

The Vendor shall provide weekly progress reports on work schedules. The Vendor shall also provide progress reports against the approved weekly work schedule.

1.19 Kick-Off Conference

A kick-off conference and organizational meeting shall be held on site. Required attendees shall be notified as to the date and time of the meeting. Minutes of the meeting shall be prepared and distributed by the FDOT Project Manager.

1.20 Submittals

1.20.1 General

This section specifies administrative and procedural requirements for submittals required for performance of the Work, including but not limited to:

- Vendor's construction schedule.
- Design and Installation plans.
- Product data.
- Special reports.

1.20.2 Coordination

The Vendor shall coordinate the preparation and processing of submittals with performance of installation activities. The Vendor shall transmit each submittal sufficiently in advance of performance of related installation activities to avoid delay.

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The Vendor shall coordinate each submittal with purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

The Vendor shall coordinate transmittal of different types of submittals for related elements of the Work so processing shall not be delayed by the need to review submittals concurrently for coordination.

FDOT reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

1.20.3 Processing

The Vendor shall allow sufficient review time so that installation shall not be delayed as a result of the time required to process submittals, including time for resubmittals.

The Vendor shall allow 10 business days for initial review. The Vendor shall allow additional time if processing shall be delayed to permit coordination with subsequent submittals. FDOT shall promptly advise the Vendor when a submittal being processed shall be delayed for coordination.

If an intermediate submittal is necessary, the Vendor shall process the submittal the same as the initial submittal.

The Vendor shall allow 10 business days for reprocessing each submittal.

No extension of contract time shall be authorized because of failure to transmit submittals to FDOT sufficiently in advance of the work to permit processing.

1.20.4 Submittal Preparation

The Vendor shall place a permanent label or title block on each submittal for identification. The Vendor shall indicate the name of the entity that prepared each submittal on the label or title block.

The Vendor shall provide a space approximately 4" x 5" on the label or beside the title block on drawings to record the Vendor's review and approval markings and the action taken.

Include the following information on the label for processing and recording action taken:

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- Project name.
- Date.
- Name and address of Vendor.
- Name and address of Sub-Vendor.
- Name and address of supplier.
- Name of manufacturer.
- Number and title of appropriate specification section.
- Drawing number and detail references, as appropriate.

1.20.5 Submittal Transmittal

The Vendor shall package each submittal appropriately for transmittal and handling. The Vendor shall transmit each submittal to FDOT using a transmittal form. Submittals received from sources other than the Vendor shall be returned without action.

The Vendor shall record relevant information and requests for data on the transmittal. The Vendor shall record deviations from contract document requirements, including all variations and limitations on the transmittal or on a separate sheet. The Vendor shall include the Vendor's certification that information complies with contract document requirements.

1.20.6 Vendor's Installation Schedule

1.20.6.1 General

The Vendor shall prepare a fully developed installation schedule. The Vendor shall submit its initial schedule within 10 days of receipt of Notice to Proceed.

The Vendor shall consider the installation of the communications shelter as the primary installation in the sequence of work.

The Vendor shall secure time commitments for performing critical elements of the work from all parties involved. The Vendor shall coordinate each element on the schedule with other installation activities; including minor elements involved in the sequence of the work. The Vendor shall show each activity in proper sequence.

The Vendor shall coordinate the installation schedule with Sub-Vendors, submittal schedule, payment requests and other schedules.

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Work required "By Others" during this project will be performed at the installed shelter and tower and "Others" will require full and equal access to the site throughout the project.

The Vendor shall be aware that the D5 RTMC is under construction on the south west side of the site. A new I-4 ramp is under construction on the east side of the site. The Vendor may be required to coordinate with District 5 and Other Vendors throughout the project in order to access the construction site.

1.20.6.2 Distribution

The Vendor shall print and distribute copies to FDOT, Sub-Vendors, and other parties required to comply with scheduled dates.

When revisions are made, the Vendor shall distribute the updated schedule to the same parties. The Vendor shall remove parties from distribution when they have completed their assigned portion of the work and are no longer involved in installation and testing activities.

1.20.6.3 Schedule Updating

The Vendor shall revise the schedule after each meeting or activity, where revisions have been recognized or made. The Vendor shall issue the updated schedule concurrently with the report of each meeting. The Vendor shall submit Notification of Work forms weekly, and as needed.

1.20.7 Drawings

The Vendor shall submit newly prepared information and, when required, accurately scaled drawings. The Vendor shall highlight, encircle, or otherwise indicate deviations from the contract documents.

When submitting drawings that do not meet all specified requirements, the Vendor shall clearly indicate on the drawings and the transmittal letter the proposed exceptions. Any drawings without clearly identified specification exceptions shall be subject to the same provisions of a "rejected" submittal.

Drawings include, but are not limited to, site plans, fence details and notes, safety climb, waveguide ladder, shop diagrams, grounding plan, electrical one line diagram, alarm block details, underground LPG tank details, indoor and outdoor equipment wall mount details,

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tower and shelter foundation details, wiring diagrams, installation drawings, and similar drawings, tower loading diagrams showing the height (to the nearest foot) and respective tower leg of installed equipment, and new equipment installed on the interior and exterior wall(s) of the shelter.

THE VENDOR SHALL SUBMIT ONE DIGITAL SET OF DRAWINGS FOR FDOT REVIEW.

The Vendor shall not use drawings without written approval from the FDOT Project Manager indicating action to be taken in connection with installation.

1.20.8 Product Data

The Vendor shall collect product data into a single submittal for each element of installation or the system. The product data shall include printed information such as manufacturer's installation instructions and performance specifications.

The Vendor shall mark each copy to show applicable choices and options. Where product data includes information on several products, some of which are not required, the Vendor shall mark copies to indicate the applicable information. The Vendor shall include the Vendor's certification that the product complies with contract document requirements.

The Vendor shall submit one copy of each required submittal.

The Vendor shall furnish copies of the final submittal to installers, Sub-Vendors, suppliers, manufacturers, and others required for performance of installation activities. The Vendor shall show the distribution on transmittal forms.

1.20.9 Submittal Actions

Except for submittals for record, information or similar purposes, where action and return is not required or requested, FDOT shall review each submittal and return comments to the Vendor.

The Vendor shall comply with FDOT's review comments.

1.20.10 Special Reports

Except when otherwise indicated, the Vendor shall submit special reports directly to FDOT within one day of occurrence requiring special report, with copies to others affected by the occurrence.

The Vendor shall prepare and submit reports of significant accidents at the site and anywhere else work is in progress to FDOT. The Vendor shall record and document data and actions, and shall comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

1.21 Project Closeout

1.21.1 Substantial Completion

Substantial Completion is defined as the point at which the equipment is fully installed, operational, has successfully passed field acceptance testing of all elements, and inspections are completed.

Before requesting inspection for certification of Substantial Completion, the Vendor shall complete the following:

- In the application for payment that coincides with, or first follows, the date Substantial Completion is claimed, include supporting documentation for completion as indicated in these contract documents and a statement showing an accounting of changes in the contract sum.
- If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete installation, and reasons the work is not complete.
- Advise FDOT of pending insurance change-over requirements.
- Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
- Obtain and submit releases enabling FDOT unrestricted use of the work and access to services and utilities; include operating certificates and similar releases.

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Upon receipt of a request for inspection for substantial completion, FDOT shall either proceed with inspection or advise the Vendor of unfulfilled requirements. FDOT shall prepare the Certificate of Substantial Completion following the inspection, or advise the Vendor of work that shall be completed or corrected before the certificate shall be issued.

FDOT shall repeat inspection when requested and assured that the work has been substantially completed.

1.21.2 Final Acceptance

Final Acceptance is defined as the point at which all work is completed, all closeout forms are completed and submitted, and equipment spares, manuals, and training have been provided.

- A. Before requesting inspection for Certification of Final Acceptance, the Vendor shall complete the following: Submit as-built documentation, maintenance manuals, final project photographs, ITS Facility Management System Attribute Forms, and similar final record information.
- B. Deliver spare parts and similar items.
- C. Complete final clean up requirements.
- D. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.
- E. Submit an updated final statement, accounting for final additional changes to the contract sum.
- F. Submit a copy of FDOT's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance. List any and all exceptions on this list.
- G. Submit all required inspection certificates, bonds, and written guarantees.
- H. Return all FDOT provided keys for access to the site. Include affidavit that duplications of keys have not occurred.

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FDOT shall re-inspect the work upon receipt of notice that all the work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to FDOT. Upon completion of re-inspection, FDOT shall prepare a Certificate of Final Acceptance, or advise the Vendor of work that is incomplete or of obligations that have not been fulfilled but are required for Final Acceptance. If necessary, re-inspection shall be repeated.

1.21.3 Closeout Checklist

All items listed below, with the exception of the last item listed, shall be bound in individual heavy-duty 3-ring vinyl covered binders. The Vendor shall mark appropriate identification on front and spine of each binder.

All items shall be submitted in triplicate within fifteen days of Substantial Completion for the project:

- Application and Certification for Payment (Final). One copy with original signatures and seals.
- Power of Attorney from Surety to make Final Payment.
- Warrantees as required by the specifications, in the name of FDOT.
- Verification that FDOT's and/or designated personnel have been trained in the use of their new equipment. Submit a sign-in sheet signed by personnel receiving the training.
- As-built documentation and maintenance and operation manuals.
- Equipment Inventory List including manufacturer and serial numbers.
- Completed ITS Facility Management System Attribute Forms
- Notarized affidavit of all Sub-Vendor payrolls, bills for materials/equipment and other indebtedness paid and satisfied.
- Final invoice

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2. WORK SITE

The Vendor shall visit and inspect the site prior to submitting a bid. The Vendor shall submit a bid for equipment and facilities work required as delineated in this specification and its appendices.

The site location is in Sanford, FL. The tower and shelter site will occupy the grass clearing along Interstate 4 westbound, approximately three quarters of a mile south of Exit 101C / SR46. The site is accessible from the west from the Wilson Road dead end, via a locked gate.

Lat: 28-48-02.76N Lon: 81-20-40.07W (WGS 84)

3. EQUIPMENT SPECIFICATIONS

3.1 General

This section establishes the minimum requirements for the communications compound, shelter, tower, DC power system, emergency power generator, obstruction lighting system, and fencing and grounding materials to be located and installed at the D5 RTMC communications site.

IN ADDITION, THE FIGURES IN THE CONTRACT PLANS MAY CONTAIN SPECIFICATIONS THAT ADD TO OR DIFFER FROM THE MAIN DOCUMENT. THE SPECIFIED DETAILS OF THE FIGURES IN THE CONTRACT PLANS SHALL TAKE PRECEDENCE OVER THE MAIN DOCUMENT.

All equipment supplied as part of this project shall be in compliance, unless otherwise stated, with the FDOT Standard Specifications for Road and Bridge Construction, and the FDOT Design Standards.

3.2 Tower Installation

Installation of all tower and facilities equipment shall meet or exceed the design requirements of this Technical Specification and standards of good engineering practice. Any damage to the existing facilities shall be repaired by the Vendor at no additional cost to FDOT. The relative arrangement of operating equipment shall be consistent with the existing site installation and with good engineering practices.

The Vendor shall refer to Contract Plans or installation details.

3.2.1 250-Foot Solid Rod Member Self-Supporting Tower

The Vendor shall supply and deliver a 250-foot solid rod member self-supporting tower assembly to the District 5 communications site. The Vendor shall furnish and install the concrete drilled pier leg foundations and shall erect and install the self-supporting tower assembly in accordance with these specifications and the Contract Plans.

The Vendor shall refer to Contract Plans for specifications and installation details.

3.2.2 Site Grounding

The Vendor shall perform all facilities work in accordance with the installation requirements delineated herein, and Section 4, to ensure that adequate grounding is installed at the communications facilities site.

Work performed at the FDOT District 5 communications site must meet the requirements herein to ensure compliance with FDOT District 5 installation practices.

ANY VARIANCE FROM THE FDOT'S PRACTICES SHALL BE SUBMITTED IN WRITING AND MUST BE PRE-APPROVED IN WRITING BY THE FDOT PROJECT MANAGER OR IT WILL NOT BE ACCEPTED.

The Vendor shall refer to Contract Plans for installation details.

3.3 Communications Equipment Shelter

The equipment shelter shall be concrete or concrete composite and include all labor, equipment, materials, foundations, and the performance of all necessary operations for the installation of a complete equipment shelter.

The shelter shall be designed for the express purpose of housing electronic communications equipment, power supplies, and related components within a controlled environment necessary for the proper operating conditions for the equipment to be installed.

The shelter shall come complete with secure doors, AC power distribution panel, - 48 VDC battery plant, emergency standby generator, obstruction lighting system,

heat/air conditioning system, lightning protection, grounding system, and other necessary appurtenances to provide for an integrated communications shelter.

The Vendor shall refer to Contract Plans for specifications and installation details.

3.4 AC Power Service Installation

The standard electrical configuration for the shelter site shall be 120/240 volts AC, 60 Hz, single phase, 200-ampere service. The Vendor shall provide the necessary power service drop and site specific power needs. All costs associated with providing power service shall be the responsibility of the Vendor.

The Vendor shall install the power service in accordance with Section 639 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction. Unless specified otherwise in the site specifics of the appendices, the underground power service shall be provided.

The Vendor shall provide all electrical connections from the service drop to the shelter's service panel.

3.5 DC Power Distribution

The Vendor shall provide and install a DC Power Distribution system including control panel with SNMP capabilities, rectifiers, and DC breaker distribution system. The Vendor shall provide and install a -48VDC battery plant and battery monitoring devices in accordance with the Contract Plans.

3.6 Install Emergency Generator Power System

A standby emergency power generator, fuel system and storage, and automatic transfer switch shall be provided at the site as required by the Contract Plans. For commonality with the FDOT sites within the District, the generator shall be a Cummins C40 N6 generator.

The Vendor shall refer to Contract Plans for specifications and installation details.

3.7 Fencing

Metal fencing shall be included and installed by the Vendor to provide complete tower and shelter perimeter security at the D5 communications site. The fence shall be Type B (chain-link) as specified in Section 550 of the FDOT's Standard Specifications for Road and Bridge Construction. The fencing materials, including posts and bracing, shall be metal and be in accordance with Section 550-3.2, Type B Fence (Chain-Link), and Index 550-002 (Fence Type B).

Construction shall be in accordance with Section 550-4 of the referenced FDOT specification. The basic fence height shall be a minimum of six feet, and shall be topped with barbed wire in accordance with Section 550-4. In addition, the fence fabric shall be fastened to a horizontal fence pole at the top of the fence.

The fence shall include (2) gates made of the same material as the fence material. The first gate shall have a minimum width of ten feet for access to the communications area of the compound. The second gate shall have a minimum width of six feet for access to the fuel storage area of the compound. Both gates shall include a gate closing arrangement that is anchored in concrete in the ground (female pipe receptacle anchored in concrete). A hardened, four-digit combination gate lock (Medeco, or approved equivalent) shall be provided by the Vendor, and the combination set to the FDOT specifications.

3.8 Weed Prevention Material

Weed prevention material shall be 6-mm plastic sheet.

3.9 Compound Gravel

The gravel or crushed rock shall be obtained locally and shall not exceed two inches in diameter, so that foot traffic is not difficult.

4. GROUNDING

Lightning damage to equipment and structures and its prevention is a major consideration in the design of communication facilities in Florida. The Vendor must construct all communication facilities in accordance with the design requirements

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delineated herein to ensure that adequate lightning protection is constructed at each site. ANY VARIANCE FROM THE FDOT DESIGN SHALL BE SUBMITTED IN WRITING AND MUST BE PRE-APPROVED IN WRITING BY THE PROJECT MANAGER OR IT WILL NOT BE ACCEPTED.

CARE MUST BE TAKEN WHEN HANDLING ELECTROSTATIC DISCHARGE (ESD) SENSITIVE DEVICES. ESD-WRISTSTRAPS AND ESD-APPROVED TOOLS SHALL BE USED AT ALL TIMES WHEN IN CONTACT OR IN CLOSE PROXIMITY TO ESD SENSITIVE DEVICES. THE VENDOR SHALL READ AND BECOME FAMILIAR WITH THE ESD PREVENTION PROCEDURES PROVIDED BY THE MANUFACTURERS OF EACH PIECE OF EQUIPMENT.

4.1 General

The purpose for installing a grounding system is to provide personnel and equipment lightning protection and to minimize the induced noise and static in the system. The following specifications must be used in conjunction with the National Electrical Code (NFPA-70) and all local grounding-related building codes.

The design of the grounding system shall follow the Contract Plans. One leg of the tower grounding system will function as the primary ground sink. The equipment shelter ground system will be installed as a separate and unique ground system. The tower and shelter ground systems shall be connected at a single point; this point will be the tower ground sink. All grounds for the shelter (utility, communication cables) shall be installed on the side of the shelter that the transmission lines and waveguides enter.

The grounding system shall be bonded at a single point such that the tower, AC power, generator, signaling equipment, and equipment frames shall be connected by the shortest practical route to the ground system.

The ground system for the surge protective devices shall be installed per the manufacturer's instructions and shall be connected to the ground system with no less than the minimum wire size specified herein or the manufacturer's recommended wire size, whichever is larger.

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Installation requirements for all devices require that lead lengths from each device to the circuit to be protected and to ground shall be minimized. SPD power device lead lengths shall not exceed ten inches. ANY VARIANCE FROM THE FDOT'S PRACTICES SHALL BE SUBMITTED IN WRITING AND MUST BE PRE-APPROVED IN WRITING BY THE PROJECT MANAGER OR IT WILL NOT BE ACCEPTED.

4.2 Conductors and Connections

4.2.1 Exothermic Bonds

ALL EXOTHERMIC BONDS SHALL BE ERICO CADWELD™ TYPE, HARGER ULTRAWELD™, OR APPROVED EQUIVALENT AND APPROPRIATE FOR THE APPLICATION. WELDING OR OTHER FORMS OF EXOTHERMIC BONDS SHALL NOT BE USED UNLESS APPROVED IN WRITING BY THE PROJECT MANAGER.

4.2.2 Conductor Sizes

Below Ground:

- a. 6-inch wide x 1/8-inch copper strap.
- b. #2 AWG minimum tinned solid copper wire.
- c. Buried Radials: 2/0 AWG tinned stranded copper wire.

Above Ground:

- A. Interior shelter perimeter ground bus: #2 AWG green jacketed stranded copper wire.
- B. Cable tray ground bus: 2/0 AWG green jacketed stranded copper wire.
- C. Grounding of equipment and specific metal objects (cable trays, etc.): #6 AWG green jacketed stranded wire.
- D. Bonding of master ground bar to external ground system: 2/0 AWG green jacketed stranded copper wire.
- E. Connection of tower ground system to shelter external ground system: 6-inch wide x 1/8-inch copper strap.

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- F. Connection of transmission line entry port to shelter ground system: 6-inch wide x 1/8-inch copper strap.
- G. Fence gate and shelter door flexible ground: 2/0 stranded copper welding wire (strand count greater than 200).

4.2.3 Connections

Below Ground:

All connections must use the exothermic bonding process.

To allow the FDOT to inspect the grounding system, the Vendor shall not backfill the openings where the underground exothermic bonds are made until the FDOT has inspected and approved the grounding system.

Above Ground:

i. Conductors:

Exothermic bonding shall be used to bond ground conductors to the tower ground bar(s). Split bolt or crimp connections shall not be used.

Fence: exothermic bonds shall be used.

ii. Connection to equipment panels, trays, etc:

Connection of conductors to equipment shall use lugs or clamps appropriate to the size and type of wire and provisions/requirements of the equipment being grounded. Wires connected to lugs or clamps shall be crimped and soldered for good electrical connection.

All non-conducting surface coatings shall be removed before each connection is made. Application of an anti-oxidant compound is required ("NO-OX" or equivalent). Star washers, or some other means appropriate to the fastener used, shall be installed to ensure a continued good electrical connection. The objective is to provide a good low maintenance electrical and mechanical connection that will not deteriorate.

iii. Connection to interior perimeter ground bus and cable tray ground bus: shall be made with Irreversible crimp connections using suitable hydraulic compression tool.

4.2.4 Conductor Bending

Ground conductors (wire and straps) shall be downward coursing and vertical, as much as possible, and be as short and straight as practical. The minimum bending radius for tower grounds shall be three feet and for interior shelter grounds eight inches. Sharp bends and multiple bends in conductors shall be avoided in all cases. Any deviation must be submitted in writing and pre-approved in writing by the Project Manager.

4.3 Ground System Element and Installation Requirements

The communication site's ground system consists of the following integrated elements:

- Tower ground ring and radials
- Tower-shelter ground interface
- Shelter exterior ground system
- Shelter interior ground system
- AC power electrode ground
- Transmission line entrance panel ground
- Fence ground
- Ancillary equipment ground (HVACs, hoods, louvers, grills, doors, etc.)

4.3.1 Tower Ground Ring and Radials

A tower ground ring and ground radial system shall be installed. Tower radials shall be installed as shown on the figures in the Appendices. The tower shall be grounded to provide a maximum electrical resistance of 5-ohms from each tower leg external ground rod with the balance of the grounding system temporarily disconnected. This shall be accomplished by means of a radial grounding system. If the electrical resistance of the ground to earth is greater than this amount, the Vendor shall supply and install additional radially configured copper-clad steel or solid copper grounding rods and ground conductors required to achieve this value at no additional cost to the FDOT. If a ground electrical resistance of 5-ohms (at each leg) becomes unachievable, no more than two additional radials (total of three per leg), radially spaced 30 degrees apart, will be required at each tower leg. The minimum

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length acceptable for ground rods is 10 feet, with a minimum diameter of 5/8 inch. The use of soil treating chemicals to lower the resistivity of the earth is specifically not allowed.

Ground rods shall be driven, using the proper tool to prevent rod deformation, to a minimum depth of two feet below finished grade. Each tower leg shall be connected to to the radial grounding system and a ground rod using 2/0 AWG stranded copper ground wire (exothermic bond).

To allow the FDOT to inspect the grounding system, the Vendor shall not backfill the openings where the underground exothermic bonds are made until after the FDOT has inspected and approved the grounding system.

4.3.1.1 Radial Ground System

The ground radial system is designed to provide a large surface area for the dissipation of lightning transient energy.

All ground rods shall be 10 feet long, driven with exothermic connections. Mechanical extension sleeves are not allowed.

4.3.2 Tower-Shelter Ground Interface

The Vendor shall bond the tower grounding system to the equipment shelter ground and utility ground by the shortest route, and by means of exothermic bonding process. A 6-inch wide x 1/8-inch flat copper strap shall be installed between the tower and the equipment shelter. Due to the impracticality of bonding 6-inch strap to a tower leg, the strap shall be bonded to the tower using two 2/0 AWG stranded copper jumpers (redundancy) and exothermically bonded to the tower and the strap.

4.3.3 AC Power Electrode Ground Integration

The Vendor shall comply with the National Electric Code with regard to the grounding for the AC power system ground. Where the National Electric Code requires a wire larger than illustrated, the Vendor shall install the larger wire.

4.3.4 Shelter Interior Ground

A #2 AWG jacketed copper ground wire shall be installed around the interior perimeter of each room of the shelter. Each loop shall be connected together at two locations as shown on the drawings in the Appendices. The ground wires shall be supported from the wall by a minimum of 1.5-inches using Halo Stand-off Clamps. Any splices of the interior perimeter ground shall be made with irreversible compression connections.

The automatic transfer switch, manual transfer switch, distribution panels, primary AC power SPD devices, and tower light controller SPD devices shall be bonded to the shelter interior perimeter ground bus using #2 AWG jacketed copper ground wire jumpers. The jumpers shall be bonded to the interior perimeter ground bus using irreversible crimp connections and mechanically connected to the equipment using double lug compression connectors.

The cable trays shall be bonded to the master ground bar, located directly below the transmission line entrance panel, at two locations (for redundancy). All points where cable tray sections meet must be made electrically continuous by use of a short jumper wire with terminals attached at each end.

All other metallic objects (door frames air conditioners, alarm system, wall mounted communications equipment, etc.) shall be directly bonded to the interior perimeter ground with the shortest possible #6 AWG minimum copper wire. The door shall be bonded to the doorframe using a braided #2 AWG flexible welding cable. Two redundant 2/0 jacketed stranded copper cables shall bond the master ground bar to the exterior single point ground. The exothermic bonding process shall be used for connecting these cables to the single point ground and mechanical double-lug compression connectors shall be used for connection to the interior master ground bar.

4.3.5 Shelter Exterior Ground System

The grounding system around the exterior of the shelter shall consist of a 10-foot ground rod at each corner of the building and one at the approximate center of each wall if the length of the wall is greater than 20 feet. The rods shall be driven using

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the proper tool to prevent rod deformation. The rods shall be placed proximately 18-inches from the building foundation, and buried with the top of the rod a minimum of 36 inches below the grade.

The ground rods shall be bonded together using #2 AWG tinned solid copper wire and the exothermic bonding process. This bonding wire shall be buried a minimum of 36 inches below the grade level.

The following additional items shall be bonded to the external shelter ground system (minimum ground bus size #2 AWG tinned solid copper wire):

- A. Metal building parts not grounded by the internal ground ring, such as downspouts, siding, etc.
- B. Ground rods provided by the power or telephone utility for grounding of AC ground or protectors (when permitted by local codes).
- C. Shelter support skid, base, or foundation if applicable.
- D. Any significant metal object.

The shelter exterior perimeter ground shall terminate onto the tower-shelter interface ground strap using exothermic bonds (see drawings in the appendices).

4.3.6 Transmission Line Entrance Panel Grounding

The transmission line entrance panel shall be bonded to the shelter exterior ground system using two 6-inch wide x 1/8-inch flat copper straps. The straps shall be mechanically fastened to the transmission line entrance panel. The straps provided by the factory are not of the required thickness and shall not be used. Below ground, because of the impracticality of exothermically bonding six-inch wide flat straps together, each flat strap shall be bonded twice (for redundancy and current carrying capacity) to the tower-shelter interface ground strap using short pieces of #2 AWG tinned solid copper wire and exothermic bonds (see drawings in the Appendices).

4.3.7 Fence Grounding

The metal compound fence shall be grounded to a fence perimeter ground wire at all posts using #2 AWG tinned solid copper wire. The fence perimeter ground wire shall be buried a minimum of 36 inches below finished grade. Ground rods shall be installed every 20 feet along a fence line. This fence perimeter wire shall be connected to the tower and shelter ground system with a #2 AWG tinned solid copper wire at a minimum of four locations (fence corners are preferred). The gate and gatepost shall be bonded together with a flexible ground wire or strap. All connections shall be exothermically bonded.

4.3.8 Ancillary Equipment Grounding

Ancillary metallic items installed within the fence compound and within 6-feet of the compound fence shall be bonded to the closest integrated ground system (fence ground, exterior shelter ground, tower ring, etc.). #2 AWG tinned solid copper wire shall be used. Connections to the integrated ground system shall be exothermic bonds. Connections to ancillary equipment shall be exothermic bonds if practical or suitable mechanical connection if not.

5. CONSTRUCTION REQUIREMENTS

5.1 General

Installation of the tower and equipment shelter shall meet or exceed the design requirements of this specification and standards of good engineering practice.

The Vendor shall be responsible for determining local facilities for delivering, storing, and legally disposing of post-installation materials. The Vendor is also responsible for location and protection of any existing underground utilities at the work site. Any damage to any existing installation shall be repaired by the Vendor at no additional cost to the FDOT.

5.2 Project Sequence

The Vendor shall install the shelter facilities, fuel tank, and equipment racks first. After the shelter and power systems are installed and grounded, the fiber optic cable shall be installed from the FDOT splice box to the shelter patch panel. The Vendor shall install the tower and remaining installation items. The Vendor shall submit a detailed installation schedule of all activities to support the coordination of activities by others at the site.

5.3 Foundation Installation

The Vendor shall submit a drawing detailing the proposed installation to the Project Manager. Orientation must be approved by the Project Manager prior to the start of construction.

All concrete work shall be performed in accordance with FDOT's Standard Specifications for Road and Bridge Construction. The Vendor shall supply a concrete mix design to the FDOT for approval. The Concrete mix design shall be signed and sealed by a Florida registered Professional Engineer. When the concrete is delivered on site, the Vendor shall provide the actual mix design to the FDOT for approval. If actual concrete mix design does not meet the requirements of the signed and sealed concrete mix design, the Vendor is not permitted to use the concrete.

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As a minimum, the Vendor shall take 10 samples (cylinders) of concrete from each truckload. The Vendor is responsible for performing concrete cylinder break tests on the samples at a period of 3, 7, 14, and 28 days. The Vendor will utilize a fifth sample as a spare in the event one of the other samples becomes damaged. The FDOT will also perform concrete break tests using the remaining five samples. The FDOT tests will be utilized as a quality assurance measurement to compare to the Vendor's break tests. The Vendor shall submit, in writing, the results of all concrete break tests.

NO CONSTRUCTION OR INSTALLATION MAY BEGIN ON A CONCRETE FOUNDATION UNTIL THE CONCRETE BREAK TESTS INDICATE THAT THE CONCRETE HAS REACHED ITS DESIGN STRENGTH.

The Vendor shall also perform slump and temperature tests for each truckload. If the concrete is beyond the limits of the design or the FDOT requirements, the Vendor will not be permitted to utilize the truckload of concrete.

5.4 Permits

The Vendor is responsible for obtaining any permits and meeting building official requirements, including associated fees. It is the Vendor's responsibility to contact applicable building officials for permit applications and submit to the FDOT for signature.

The Vendor is required to obtain all permits which may require picking up applications, filling out the applications, obtaining a FDOT signature, and then submitting the permit to the regulating agency.

CONTACT WITH LOCAL AGENCIES MUST BE FIRST APPROVED BY THE PROJECT MANAGER.

The Vendor is responsible for filing any necessary notifications of construction with the United States Government Federal Aviation Administration and Federal Communications Commission

5.5 Site Preparation

The FDOT will provide site space for the equipment and for tower and shelter installations. The Vendor shall install the tower and shelter and other necessary facilities and equipment in the provided space and make all necessary electrical and mechanical connections. The Vendor shall be responsible for providing and connecting electrical power to the shelter. Routing of wires and cables shall be neat and orderly. Electrical connectors shall be the responsibility of the Vendor. General site preparation, specific building tie-down, and landscaping shall be the responsibility of the Vendor. All environmental protection requirements shall be complied with. The Vendor must contact the local FDOT district contact person and Project Manager for specific information regarding site preparation in conjunction with each equipment shelter. The Vendor shall provide gravel ground covering in the fenced-in compound area unless otherwise specified.

5.5.1 Clearing of Land

Clearing of brush, trees, or any other obstructions, including the removal of asphalt or concrete, is the responsibility of the Vendor. The Vendor shall coordinate with the Project Manager as to the extent and schedule for such work to ensure that there is no interference to concurrent operations at the site. Any tree stumps resulting from clearing shall be grubbed. All environmental protection requirements shall be complied with.

Any site clearing and tree trimming must be approved in writing in advance by the FDOT.

5.5.2 Fencing

Fencing (see Section 3.7) shall be installed around the perimeter of the tower and shelter. The fence shall form a rectangle or square shape, unless otherwise specified, and allow for a minimum space of five feet of space between the fence and any enclosed item (i.e., tower, shelter, and generator). The fence shall be grounded in accordance with Section 4.3.6.

5.5.3 Compound Treatment

The fenced compound area shall be treated with a FDOT approved herbicide, covered with weed prevention material (see Section 3.8), then gravel or crushed rock (see Section 3.9) shall be applied to the area to a depth of approximately four inches such that mowing and other maintenance requirements are minimized, unless otherwise specified.

5.6 Sanitary Provisions

The Vendor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his/her employees as may be necessary to comply with regulations of the County or the Department of Health and Rehabilitative Services. No nuisance will be permitted.

5.7 Debris Removal and Site Integration

At the completion of the work activities specified herein, the Vendor shall remove and properly dispose of all debris, in accordance with the instructions of the FDOT Project Manager.

The trash generated from the work activities, including lunch bags and drinks, must be stored in a neat manner until disposed of properly. The Vendor shall be responsible for removing and legally disposing of trash in a timely manner. Trash shall not be allowed to blow around or away from the construction site.

The Vendor shall finish the disturbed areas to match the rest of the compound. Voided areas shall be filled with soil. New weed prevention material and rocks shall be added to integrate the area with the existing compound. The Vendor shall remedy all hills, holes, and trenches, that are a direct result of the work activities specified herein, at no additional cost to the FDOT. The Vendor shall comply with all environmental protection requirements.

6. INSPECTION, VERIFICATION, AND TESTING

The FDOT Project Manager, or designated representative, shall be present to oversee and inspect all installation and removal activities. All inspection shall be performed by the Vendor and witnessed by the FDOT Project Manager, or designated representative. The Vendor shall notify the individuals listed below of the start of work a minimum of 10 working days in advance. The CGC has the authority to stop work at the site if the work is not being performed in a manner consistent with these specifications, or if the work is being performed in an unsafe manner.

Name	Organization	Telephone Number
Randy Pierce	Florida Department of Transportation	(850) 410-5608
Danielle Morales, P.E.	Atkins North America	(850) 410-5617

6.1 General

The Vendor shall notify the FDOT Project Manager and the FDOT's local personnel at least ten days prior to completion of the installation. Following tower and equipment shelter installation, the Vendor, in conjunction with the FDOT Project Manager or designated personnel, shall verify that all equipment is correctly installed and functional.

ALL TESTS SHALL BE WITNESSED BY THE FDOT PROJECT MANAGER OR DESIGNATED PERSONNEL. ALL TEST RESULTS SHALL HAVE A WITNESS SIGNATURE OF THE DESIGNATED FDOT PERSONNEL OR THE TEST RESULTS WILL NOT BE ACCEPTED.

A test report, delineating the measured value of the tower base electrical resistance to earth, with method of measurement and test instrumentation used, shall be delivered to the Project Manager and a copy delivered to the FDOT's local personnel.

All test results shall be recorded in a standardized format to be determined by the Vendor. The format to be used for recording of test report data shall be submitted to the FDOT for approval prior to testing. All recorded test report data shall be dated, witnessed, and signed by at least one representative of the FDOT and the Vendor.

The Vendor, at no cost to the FDOT, shall remedy all deficiencies.

6.2 Ground System

For ground system inspections, the Vendor shall notify the Project Manager and the FDOT's local personnel at least two days prior to completion of the installation. Below grade ground installations and ground connections shall not be backfilled until inspected and approved by the FDOT.

The Vendor shall perform a three point earth ground test for measuring the resistance of the site's earth ground electrode system to validate the earth ground resistance. This test is also known as the 62 percent Fall of Potential Method. The earth ground test method evaluates the resistance of the site ground resistance by circulating a test current through the soil, test leads (ground stakes), grounding electrode under test and test instrument. The earth ground resistance testing shall be performed by a calibrated tester. The earth ground tester calibration date shall be current (within 12 months of the test date). The ground resistance must be better than or equal to 5 ohms.

6.3 Equipment Shelter Inspection

6.3.1 Mechanical Inspection

The mounting of the equipment to the shelter walls shall be inspected to ensure adequate support has been provided. The HVAC system shall be tested for adequate cooling, heating, and dehumidification. The building shall be inspected for proper sealing of HVAC units, conduits, waveguide ports, telephone/signal cable, and ground conductor penetrations. The Vendor is responsible for correcting any deficiencies.

6.3.2 Electrical Inspection

The tower lights, shelter lights, and smoke detector shall be verified for proper operation. The Vendor shall verify proper power load balance and provide a report to the Project Manager and FDOT's local personnel prior the acceptance of the site. The Vendor is responsible for correcting any deficiencies.

6.4 DC Power Distribution System

The DC Power Distribution System shall be inspected for proper installation. The rectifiers shall be inspected for proper load balancing. The rectifier alarms shall be verified for proper operation. If the test fails, the Vendor shall correct the problem and repeat the test.

6.5 Emergency Power System Inspection

6.5.1 Emergency Generator Inspection

The emergency generator shall be inspected for proper installation. A load bank test shall be performed for the full load rating of the generator for a minimum of 4 continuous hours. The generator shall be inspected for proper voltage, current, and frequency output. The generator alarms shall be verified for proper operation. If the test fails, the Vendor shall correct the problem and repeat the test. The fuel level shall be verified to be full prior to the acceptance of the site.

6.5.2 Automatic Transfer Switch Inspection

The automatic transfer switch shall be inspected for proper installation and secureness to the shelter. The automatic transfer switch shall be tested for the proper operation of the switching functions and the exercise timer. If the test fails, the Vendor shall correct the problem and repeat the test.

6.6 Alarms Inspections

Alarms that report to the site alarm punchblock shall be verified for proper operation and configuration.

6.7 Grounding Inspection

The grounding system will be inspected for proper connection types, tightness, workmanship, and conformance with the approved design. Any exothermic bonds that are deemed unsatisfactory shall be repaired with new bonds.

6.8 Site Inspection

The site shall be inspected to be free of debris and that excavations are backfilled and restored.

6.9 Performance Testing

Following the completion of all acceptance testing and inspections, the installed site shall be subjected to a minimum 20-day performance period.

For the purpose of the successful performance period, failure of operation is defined as the failure of a major component of the site (tower lights, HVAC system, electronic equipment, emergency generator, automatic transfer switch, etc.). .

The performance verification shall be accomplished with the Project Manager or his designee present. Upon acceptance of the criteria of the test by the Project Manager, the 20-day performance period shall begin.

If a successful performance period cannot be accomplished within 45 consecutive calendar days after the equipment testing and inspection, the FDOT reserves the right to deem the Vendor in default and enforce the provisions set forth in the contract.

6.9.1 Battery Load Test

The vendor shall perform a battery capacity test in accordance with manufacturer's specifications, and the latest revision of IEEE Std 1188 – IEEE recommended practice for maintenance, testing, and replacement of valve-regulated lead-acid (VRLA) batteries for stationary applications.

6.10 Acceptance

The Vendor shall provide an acceptance report at the conclusion of the testing for FDOT review and approval. Upon completion of the successful performance period the FDOT shall issue acceptance.

7. SUBMITTAL DATA AND NOTIFICATION REQUIREMENTS

7.1 Design Documentation Submittal

All design documentation submittals shall be delivered to the Project Manager. These submittals are in addition to any documentation submittal that may be required by the local building official as required in Section 5.4 of this specification.

The Vendor shall furnish one copy of submittals.

Construction shall not begin until the FDOT has approved all submitted plans.

The Vendor shall supply sufficient information regarding the proposed equipment to allow the FDOT to fully determine compliance with the specifications set forth in this document. The Vendor shall furnish the following minimum requirements:

- A. Specification sheets, manufacturer warranty information, and any other information that would assist the FDOT in the equipment's evaluation.

7.2 Equipment Shelter Documentation Requirements

The Vendor shall obtain sufficient Professional Engineering documentation to show that the shelter and foundation meets or exceeds all requirements of Section 3.2. Such documentation shall:

- A. Include complete plans and drawings showing all equipment shelter material, hardware, appurtenances, and accessories.
- B. Include the following written statement: "This equipment shelter design meets or exceeds all requirements of Section 3.2 of the specification as issued by the Department of Transportation, Departmental Purchasing, Project Number _____."
- C. For the foundation, be approved, signed, dated, and sealed by a Professional Engineer qualified and authorized pursuant to Chapter 471, Florida Statutes.

7.3 Tower Documentation Requirements

The Vendor shall obtain sufficient Professional Engineering documentation to show that the tower and its foundation meets or exceeds all requirements of Section 3.2. Such documentation shall:

- A. Include complete plans and drawings showing the structure, foundation, hardware, appurtenances, and accessories.
- B. Include the following written statement: "This tower design meets or exceeds all requirements of Section **Error! Reference source not found.** of the specification as issued by the Department of Transportation, Departmental Purchasing, Project Number _____."
- C. For the foundation, be approved, signed, dated, and sealed by a Professional Engineer qualified and authorized pursuant to Chapter 471, Florida Statutes.

7.4 Grounding Design Documentation Requirements

The Vendor shall submit plans for each tower site ground system configuration to the Project Manager for approval a minimum of ten days before planned construction.

CONSTRUCTION SHALL NOT BEGIN UNTIL GROUND PLAN SUBMITTALS HAVE BEEN APPROVED BY THE PROJECT MANAGER.

7.5 As-Built Survey and Drawings

The Vendor shall provide photographic documentation of all work performed at each site; clearly showing the installation of new facilities, equipment, grounding, and installation hardware including mounting and grounding connections and other ancillary hardware to the tower.

The Vendor shall submit detailed as-built surveys and drawings depicting the location of the components of the communications facilities with respect to local features and benchmarks. The survey shall include a measurement of latitude,

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longitude, and ground elevation of the tower constructed as part of this project. The survey shall also include the location of the shelter ground system. As-built drawings shall illustrate all details of the installation of any punchblocks including wiring diagrams.

As-built documentation shall be provided in electronic format, as well as printed.

7.5.1 Visio

The awarded Vendor may request a copy of the contract plans design drawings in Visio format as a reference for developing as-built documentation.

THE VISIO DRAWINGS ARE FOR DIAGRAMMATICAL PURPOSES ONLY AND ARE NOT CONSIDERED AS-BUILT DOCUMENTS. THE VENDOR IS RESPONSIBLE FOR DEVELOPING ALL AS-BUILT DRAWINGS.

7.5.2 ITS Facility Management System

The Vendor shall complete the Warning Lights section of ITS Facility Management System Attribute Form ITSFM053 in accordance with this specification. The form included in this section is for diagrammatical purposes only. The Vendor shall download the actual form from the following ITS Facility Management System web site address:

http://www.dot.state.fl.us/trafficoperations/ITS/Projects_Telecom/ITSFM/ITSFM.shtm

It is important that the Vendor download and use the most current file version prior to starting installation, survey, inventory, or feature import tasks because of the frequency of updates.

FLORIDA DEPARTMENT OF TRANSPORTATION

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		STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ITS Facility Management System Tower Support Structure Attribute Form		 ITSFM053 Page 1 of 1 Rev. 11/12	
Date:	Inspector:	Financial Project ID:	As-Built Drawing No:		
Tower Support Structure (SIN) :		Latitude / Longitude (N/W)			
Site Name:		N =			
Owner: _____ County: _____		W=			
Tower Support Structure					
Tower Information					
Year Installed:		Property ID# :			
Tower Type: <input type="checkbox"/> Self-Support <input type="checkbox"/> Guyed <input type="checkbox"/> Mono Pole <input type="checkbox"/> Crank Up		Safety Climbing Hardware: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Tower Manufacture:		Tower Condition: <input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Fair <input type="checkbox"/> Poor <input type="checkbox"/> Scrap			
Tower Model:		Antenna Structure Registration:			
Tower Finish: <input type="checkbox"/> Galvanized <input type="checkbox"/> Painted		Aeronautical Study Number:			
Tower Height (Ft):		Tower Inspection Date:			
Antenna Components			Communication Cables		
Year Installed:		Communication Cable Type:			
Antenna Manufacture:		<input type="checkbox"/> Coax – Corrugated <input type="checkbox"/> Coax – Braided <input type="checkbox"/> Waveguide			
Antenna Model:		Communication Cable Size:			
Antenna Type:		<input type="checkbox"/> 1/2" <input type="checkbox"/> 7/8" <input type="checkbox"/> 1 1/4" <input type="checkbox"/> EW63 <input type="checkbox"/> EW90 <input type="checkbox"/> WE65			
<input type="checkbox"/> Dish <input type="checkbox"/> Panel <input type="checkbox"/> Yagi <input type="checkbox"/> Omni <input type="checkbox"/> Folded Dipole <input type="checkbox"/> Unknown		<input type="checkbox"/> Other: _____			
Antenna Polarization:		Communication Cable Length (Ft.): _____			
<input type="checkbox"/> Horizontal <input type="checkbox"/> Vertical <input type="checkbox"/> Circular <input type="checkbox"/> Dual		Communication Cable Connector Type:			
Antenna Direction (Azimuth in Degrees): _____		<input type="checkbox"/> 7/16 DIN <input type="checkbox"/> BNC <input type="checkbox"/> N-Type <input type="checkbox"/> UHF <input type="checkbox"/> WG63 <input type="checkbox"/> Other: _____			
Antenna Mount:		Warning Lights			
<input type="checkbox"/> Direct <input type="checkbox"/> Pipe <input type="checkbox"/> Side Arm <input type="checkbox"/> Wall <input type="checkbox"/> Bridge <input type="checkbox"/> Cantilever Structure <input type="checkbox"/> Overhead Structure		Beacon Type: _____			
Antenna Installed Location (Tower Leg):		Beacon Manufacture: _____			
<input type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> Unknown		Beacon Model: _____			
Antenna Point of Attachment (Ft.): _____		Light Controller Manufacture: _____			
Antenna Jumper Size (Pigtail): <input type="checkbox"/> 1/2" <input type="checkbox"/> 7/8" <input type="checkbox"/> 1 1/4" <input type="checkbox"/> EW63 <input type="checkbox"/> EW90 <input type="checkbox"/> WE65 <input type="checkbox"/> Other: _____		Light Controller Model: _____			
Antenna Jumper Length: _____		Side Markers Installed: <input type="checkbox"/> Yes <input type="checkbox"/> No			
		Side Markers Type: _____			
		Side Markers Manufacture: _____			
		Side Markers Model: _____			
		Side Markers Point-of-Attachment (Ft.): _____			

Figure 7-1: Example ITS Facility Management Attribute Form