Technical Specifications

Distributed Antenna System
Bed Building I & Services Replacement
Building
Project # 2009096794

Version 1.0
December 2009
SECTION 27 00 00

COMMUNICATIONS BASIC REQUIREMENTS

PART 1 - General

1.1 Summary

A. This Section includes general administrative and procedural requirements for Division 27.

B. The requirements described herein include the following:
   1. References
   2. Definitions
   3. System Description and Existing Conditions
   4. Submittals
   5. Quality Assurance
   6. Delivery, Storage and Handling
   7. Scheduling
   8. Warranty
  10. Field Quality Control.
  11. Project Closeout and Record Documents

C. Related Items
   1. Section 275319 - Distributed Antenna System

1.2 References

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.

B. Codes: Perform Work and furnish materials and equipment under Division 27 in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:
   1. United States Department Of Labor (DOL) Regulations (Standards - 29 CFR)
      a. Part 1910, "Occupational Safety and Health Standards"
   2. National Fire Protection Agency (NFPA)
      a. NFPA 70, "National Electrical Code" (NEC).
      b. NFPA 75, "Protection Of Information Technology Equipment"
   5. Uniform Fire Code (UFC).
   7. National, State, Local and other binding building and fire codes.
8. FCC Regulations:
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network

C. Standards: Perform Work and furnish materials and equipment under Division 27 in accordance with the latest editions of the following standards as applicable:
1. Underwriter’s Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:
   a. UL 1963: Communications-Circuit Accessories
   b. UL 2024A: Optical Fiber Cable Routing Assemblies
2. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
   a. Part 1: General Requirements
4. ANSI/TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure
5. ANSI/J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   a. TIA/EIA-758-1 Addendum No. 1
6. EIA testing standards.
7. Insulated Cable Engineers Association (ICEA):
   a. Telecommunications Distribution Methods Manual (TDMM)

D. Make a copy of each document readily available during the course of construction for reference by field personnel.

1.3 Definitions
A. The Definitions of Division 01 shall apply to Division 27 sections.
B. In addition to those Definitions of Division 01, the following list of terms as used in this specification defined as follows:
   1. “Furnish”: To purchase, procure, acquire, and deliver complete with related accessories.
   2. “Install”: To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Make installation complete and ready for regular operation.
   3. “Provide”: To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation. “As directed”: As directed or instructed by the Owner, or their authorized representative.
   5. “Identifier”: A unique code assigned to an element of the Telecommunications infrastructure that links it to its corresponding record.

1.4 SYSTEM DESCRIPTION
A. In circumstances where the Specifications and Drawings conflict, the Drawings shall govern quantity and the Specifications shall govern quality.

1.5 Submittals
A. Submit required submittals to the General Contractor in the quantities and formats as required under the general contract. In the absence of requirements, provide as described in the following with reference to quantity and format.

B. Failure to comply with requirements in part or whole shall constitute grounds for rejection.

C. Submittal Description: Product Data
   1. Obtain written approval from the Engineer for the product data submittal prior to materials and equipment purchase order and prior to installation.
   2. Quantity: Submit product data submittals as described in Division 01. In the absence of requirements given, submit four product data submittals.
   3. Format:
      a. Submit each product data on 8-1/2 x 11 inch paper.
      b. Package product data using a 3-ring binder, plastic cover, or similar.
      c. Clearly label the cover and spine of each submittal with the following information (e.g., if in a 3-ring binder, insert the submittal information in the transparent front cover and spine pockets):
         1) Client Name.
         2) Project Name and Address.
         3) Project Submittal Number.
         4) Submittal Name (e.g., “Product Data Submittal For Telecommunications Equipment Rooms”).
         5) Specification Section Number (e.g., “Section 271100”).
         6) Date of Submittal. Format: <month> <day>, <year> (e.g., “January 1, 2008”).
         7) Contractor Name.
      d. Include a Table Of Contents at the beginning of the submittal that lists materials by article and paragraph number (e.g., “2.02 Equipment Racks”).
      e. Include tabbed separators for improved navigation through the submittal.
   4. Content:
      a. Cover Letter: Include a cover letter stating that the submittal is in full compliance with the requirements of the Contract Documents. Sign (and stamped, if applicable) cover letter and list items and data submitted.
      b. Product Information: Include manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) to clearly describe the product's characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test data, typical usage examples, independent test agency information, and storage requirements. Clearly indicate by arrows or brackets precisely what is being submitted and those optional accessories, which are included and those which are excluded. At a minimum, include products listed in Division 27. Include relevant products that will be installed, which are not listed in the specifications.
      c. Seismic Calculations: Include anchorage calculations for floor mounted fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR.
Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for anchors. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the City of San Jose for review and approval.

d. Resubmittals: Provide a cover letter with the resubmittal that lists the action taken and revisions made to each product submittal in response to Submittal Review Comments. No review shall take place for any resubmittal packages that is not accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

D. Submittal Description: Shop Drawings

1. Obtain written approval from the Engineer for the shop-drawings submittal prior to the release of materials and equipment purchase order and prior to installation.

2. Quantity and Media: Submit shop-drawing submittals as described in Division 01. In the absence of requirements given, submit four full-size sets of shop drawings on bond or "eco-bond".

3. Format:
   a. Produce shop drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
   b. Use the same size drawing sheet as the drawings of the Contract Documents, and use the project title block.
   c. Text: minimum of 3/32" high when plotted at full size.
   d. Use identical symbols as those in the drawings.
   e. Screen background information.
   f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
   g. Label each sheet in the shop drawings set with the Specification Section Number (e.g., "271523").
   h. Scaling:
      1) Scale floor plans at 1/8"=1'-0".
      2) Scale enlarged room plans at 1/4"=1'-0".
      3) Scale wall elevations at 1"=1'-0".
      4) Scale rack elevations at 1"=1'-0".

4. Content:
   a. Submit shop drawings if the proposed installation differs from the Contract Documents or the design intent.
   b. Cover Letter: Accompany each shop drawing submittal with a cover letter stating that the shop drawings have been thoroughly reviewed by the Contractor and are in full compliance with the requirements of the Contract Documents. Have the person who prepared the submittal sign (and stamped, if applicable) the cover letter and include a drawing index. Failure to comply with this requirement shall constitute grounds for rejection of submittal.
   c. Drawing Information: Shop drawing submittals shall consist of floor plans, enlarged room plans, wall and rack elevations, installation details, and other
aspects of the system that differ from the Contract Documents or the design intent. Use the same scales as the Drawings (e.g., 1/4" = 1'-0" for enlarged room plans).

d. Seismic Calculations: Include anchorage calculations for floor mounted fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for anchors. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the City of San Jose for review and approval.

e. Resubmittals: Accompany resubmittals with a cover letter that lists the revisions made to each drawing in response to Submittal Review Comments. Failure to include this cover letter will constitute rejection of the resubmittal package without review.

E. Submittal Description: Record / As-Built Drawings

1. Quantity and Media: Submit shop drawing submittals as described in Division 01. In the absence of requirements given, submit four full-size sets of shop drawings on bond or "eco-bond" and submit one set of electronic files on CD-ROM.

2. Format:
   a. Produce shop drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
   b. Use the sheet size as the drawings of the Contract Documents, and use the project title block.
   c. Text: minimum of 3/32" high when plotted at full size.
   d. Use symbols identical to the symbols shown on the Drawings.
   e. Screen background information.
   f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.

3. Content:
   a. Submit Record Drawings that fully represent actual installed conditions and that incorporate modifications made during the course of construction.
   b. Floor Plans: Scale floor plans at 1/8"=1'-0". Floor plans shall show:
      1) Locations and identifiers of telecommunications devices.
      2) Size, quantity, location, and routes of pathways (such as cable trays, cable basket, conduits, cable hangers, and other cable support devices).
   c. Rooms Drawings: Applicable rooms: BDFs, IDF. Room drawings shall show:
      1) Floor layouts – scaled at either 1/4"=1'-0" or 1/2"=1'-0", showing dimensioned placement of equipment cabinets/frames, rack bays, etc.
      2) Overhead layouts – scaled at either 1/4"=1'-0" or 1/2"=1'-0", showing dimensioned placement of overhead cable support (e.g., cable tray, cable basket, cable runway, conduit sleeves, etc.)
      3) Rack elevations – scaled at 1"=1'-0", showing placement of termination and other equipment installed onto rack bays

COMM BASIC REQUIREMENTS
27 00 00 - 5
4) Wall Elevations – scaled at 1"=1'-0", showing dimensioned placement of termination hardware (e.g., termination/crossconnect blocks)

F. Submittal Description: Operation and Maintenance (O&M) Manuals
1. Quantity: Submit quantity of O&M Manuals as described in Division 01. In the absence of requirements given, submit four O&M Manuals.
2. Format:
   a. Submit each O & M Manual in a white, 3-ring binder with front cover and spine clear pockets for insertion of the project information.
   b. Clearly label the cover of each O&M Manual with the following information:
      1) Client Name.
      2) Project Name and Address.
      3) Manual Name (e.g., "Operation And Maintenance Manual for Telecommunications Cabling System").
      4) Date of Submittal. Format: <month> <day>, <year> (e.g., “January 1, 2008”).
      5) Contractor Name.
   c. Include a Table Of Contents at the beginning that lists the contents.
   d. Include tabbed separators for improved navigation through the manual.
3. Content:
   a. 11”x17” prints of As-Built Drawings, as described above
   b. Manufacturer’s original catalog information sheets for each component provided under applicable Section (typically, this is similar to the Product Data submittal)
   c. Warranty certificate from the manufacturer and the Contractor
   d. Manufacturer’s instructions for system or component use
   e. Instructions for maintenance and warranty issues

1.6 QUALITY ASSURANCE
A. Manufacturer Qualifications
   1. Five continuous years, minimum, design and manufacture of the materials and equipment specified herein.
   2. Manufacturer(s) of products and equipment specified herein shall demonstrate that they have a quality assurance program in place to assure that the specifications are met. Include in the program, at a minimum, provisions for:
      a. Incoming inspection of raw materials
      b. In-process inspection and final inspection of the cable product
      c. Calibration procedures of test equipment to be used in the qualifications of the product
      d. Recall procedures in the event that out of calibration equipment is identified.
   3. Conform to government standards on quality assurance for applications within these specifications.

B. Contractor Qualifications
   1. A current, active, and valid C7 or C10 California State Contractors License
   2. Five, minimum, continuous years experience
   3. Five, minimum, completed projects similar to scope and cost
   4. Evidence of technicians qualified for the work
   5. IBEW / CWA union affiliation
C. Materials
   1. Materials, support hardware, equipment, parts comprising units, etc., shall be new, unused, without defects and of current manufacturer, materials
   2. Use only products and applications specified in this Section, unless otherwise submitted and approved in writing.

D. Regulatory Requirements
   1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Conform Work under Division 27 to the most stringent of the applicable codes.
   2. Provide the quality identified within these Specifications and Drawings when codes, standards, regulations, etc. allow Work of lesser quality or extent. The Contract Documents address the minimum requirements for construction.

E. Project Management and Coordination Services
   1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility include, but are not limited to, the items listed in this section.
   2. Review of Shop Drawings Prepared by Other Subcontractors:
      a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with Work.
      b. Perform a thorough review of the shop drawings to confirm compliance with the service requirements contained in the Division 27 contract documents.
         Document discrepancies or deviations as follows:
            1) Prepare memo summarizing the discrepancy.
            2) Submit a copy of the specific shop drawing, indicating via cloud, the discrepancy.
      c. Prepare and maintain a shop drawing review log indicating the following information:
         1) Shop drawing number and brief description of the system/material.
         2) Date of the review.
         3) Name of the individual performing the review.
         4) Indication if follow-up coordination is required.

F. Drawings
   1. Follow the general layout shown on the Drawings except where other Work may conflict with the Drawings.
   2. Drawings for the Work within this Division are essentially diagrammatic within the constraints of the symbology applied.
   3. The Drawings do not fully represent the entire installation for the Telecommunications Cabling System. Drawings indicate the general route for the cables and the location of outlets. The Drawings might not expressly show conduits, sleeves, hangers, etc., but are required.

G. Role of the Engineer
   1. During the construction phase of the project, the Engineer will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and ‘process’) relevant Requests for Information (RFIs),
and act as an interface between the Contractor and the Owner.
2. The Owner has retained the Engineer's services to observe the Work for
general compliance with the Contract Documents and to ensure that the
installation meets the design intent of the system.
3. In general, the Engineer will participate during the construction phase as
follows:
a. Review product data and shop drawings submittals for general compliance
with the contract drawings and specifications.
b. Review changes as they arise, and confirm that the proposed solutions
maintain the intended functionality of the system.
c. Interpret field problems for Owner, and translate between Owner and
Construction Team.
d. Review the testing procedures to confirm compliance with industry-accepted
practices.

1.7 DELIVERY, STORAGE AND HANDLING
A. Delivery
1. Do not deliver products to the site until protected storage space is available.
2. Coordinate materials delivery with installation schedule to minimize storage time
at jobsite.
3. Deliver materials in manufacturer's original, unopened, undamaged packaging
and containers with identification labels (name of the manufacturer, product
name and number, type, grade, UL classification, etc.) intact.
4. Immediately replace equipment damaged during shipping at no cost to the
Owner, so as not to impact the construction schedule.

B. Storage and Protection
1. Store materials in clean, dry, ventilated space free from temperature and
humidity conditions (as recommended by manufacturer) and protected from
exposure to harmful weather conditions.
2. Comply with manufacturer's requirements for each product. Comply with
recommended procedures, precautions or remedies as described in the Material
Safety Data Sheets (MSDS) as applicable.
3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect
units from dirt, water, construction debris, and traffic.
4. Storage outdoors wrapping or provide a heavy canvas/plastic cover to protect
units from dirt, water, construction debris, and traffic.
5. Provide heat where required to prevent condensation or temperature related
damage.

C. Handling
1. Handle materials and equipment in accordance with manufacturer's written
instructions. Handle with care to prevent damage, breakage, denting, and
scoring.
2. Do not install damaged materials and equipment. Replace damaged equipment
at no cost to the Owner.

1.8 SCHEDULING
A. Unless otherwise specified, the construction schedules of the Sections within
Division 27 may be combined into a single, overall schedule.
B. Obtain written approval from the Owner or Owner’s Representative for schedule of this Work. Ensure schedule’s coordination throughout trades related to Work.

1.9 Warranty

A. Render service within 24 hours of system failure notification. Note deviations or improvements to this service at the time of bid and obtain written acceptance from the Owner, or Owner’s Representative.

B. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. Provide complete replacement parts within a 24-hour period during the warranty period.

C. Warranty installed hardware, under normal use and service, to be free of defects and faulty workmanship during the warranty period. Keep the system in operating condition at no additional material or labor costs to the Owner during the warranty period.

D. The manufacturers shall demonstrate that a quality assurance program is in place to assure that the specifications are met. Include in the program, as a minimum, provisions for:
   1. Incoming inspection of raw materials
   2. In-process inspection and final inspection of the product
   3. Calibration procedures of test equipment to be used in the qualifications of the product
   4. Recall procedures in the event that out of calibration equipment is identified.

E. Conformance to certain government standards on quality assurance may be required for some applications outlined in these specifications.

PART 2 - Products

2.1 General

A. Materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards, other applicable federal, state, and local laws.

B. Product numbers are subject to change by the manufacturer without notification. In the event a product number is invalid or conflicts with the written description, notify the Owner/Engineer in writing prior to ordering the material and performing installation work.

2.2 Product Submittal At Time Of Bid

A. At the time of bid, include a list of major products in the Contract documenting the intended solution. Examples of major products may include: active components, cable, racks, cabinets, cable tray.

PART 3 - Execution

3.1 Permits and Inspections

A. Obtain and pay for permits and inspections required for the Work.
B. Furnish materials and execute workmanship for this Work in conformance with applicable legal and code requirements.

C. Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of legal authority having jurisdiction.

D. Arrange and pay for review/inspection from compliance officials responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with requirements of reference codes indicated herein.

3.2 Examination

A. Conditions: Verify existing conditions, stated under other sections, are acceptable for installation in accordance with manufacturer's instructions.

B. Pathways: Verify that pathways and supporting devices, provided under other sections, are properly installed, and that temporary supports, devices, etc., have been removed.

C. Field Measurements: Verify dimensions of pathways, including length. For example, "True Tape" the conduits.

3.3 Field Quality Control

A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule.

B. Construction Meetings: Participate in construction coordination meetings throughout the course of construction to review the progress and to resolve issues and conflicts. Prepare and distribute meeting agenda for telecommunication issues prior to, and meeting notes after meetings, in a format acceptable to the Engineer. Provide the Telecommunication Engineer with the meeting notes within 3 business days following the meeting.

C. Scheduling: Keep the construction schedule current, based on the results of the construction meetings. Issue revised schedules to the General Contractor for approval. At minimum, schedule must cover critical due dates, tasks, and milestones. Prepare and issue the Telecommunication Engineer updated schedules, within 3 business days, whenever there are modifications.

D. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion and inspection as required.

3.4 Installation

A. Complete work in a neat, high-quality manner, relative to common industry practices, and in accordance to NECA "Standard of Installation".

B. Conform to applicable federal, state and local codes, and telephone standards.

C. Coordinate the entire installation with the General Contractor, and their
subcontractors, to meet the construction schedule.

D. Manufacturer’s Instructions:
   1. Comply with manufacturer’s product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
   2. Maintain jobsite file of Material Safety Data Sheets (MSDS) for each product delivered to jobsite packaged with an MSDS.

E. Adjusting:
   1. Make changes and revisions to the system to optimize operation for final use.
   2. Make changes to the system such that defects in workmanship are corrected and cables and the associated termination hardware pass the minimum test requirements.

F. Protection
   1. Protect installed products and finish surfaces from damage during construction.

3.5 Repair/Restoration

A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.

B. Punch List:
   1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
   2. Provide punch list to Engineer for review prior to performing punch walk with the Engineer.

C. Re-Installation:
   1. Make changes to adjust the system to optimum operation for final use. Make changes to the system such that defects in workmanship are correct and cables and the associated termination hardware passes the minimum test requirements.
   2. Repair defects prior to system acceptance.

3.6 Cleaning

A. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

C. Repair or replace damaged installed products.

D. Legally dispose of debris.

E. Clean installed products in accordance with manufacturer’s instructions prior to Owner's, or Owner’s Representative's, acceptance.

3.7 Demonstration

A. On completion of the acceptance test, schedule a time convenient with the Owner,
or Owner's Representative, for instruction in the configuration, operation, and maintenance of the system.

B. Provide 2 hours, minimum, of on-site training by a factory-trained representative. Document dates and times of training, and submit a “sign-in” sheet for individuals trained, as part of the close out documentation.

3.8 Certification

A. Submit to Owner, or Owner's Representative, a written form of acceptance for signature. Complete corrections (punch list items) prior to issuing acceptance form.

END OF SECTION
SECTION 275319

DISTRIBUTED ANTENNA SYSTEM

PART 1 - General

1.1 Summary

A. Section includes: In-building Distributed Antenna System, to support multiple wireless services

B. Related Sections

1. Comply with the Related Sections requirements of Section 270000.

1.2 References

A. Comply with the References requirements of Section 270000.

B. In particular or addition to the codes and standards listed in Section 270000, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. FCC Regulations:
   a. Part 15: WLAN
   b. Part 22: 850 MHz cellular band services
   c. Part 24: Personal Communications Server
   d. Part 27: Miscellaneous Wireless Communications Services
   e. Part 90: Specialized Mobile Radio Service

1.3 Definitions

A. Definitions as described in Section 270000 shall apply to this section.

B. In addition to those Definitions of Section 270000, the following list of terms as used in this specification defined as follows:

1. "AWS": Advanced wireless

2. "DAS": Distributed Antenna System (synonymous with in-building antenna system)

3. "iDEN": Integrated digital enhanced network

4. "LMR": Land Mobile Radio

5. "LTE": Long Term Evolution

6. "PCS": Personal communications service

7. "RF": Radio Frequency

8. "RSSI": Received signal strength indication


10. "WIFI": Wireless Fidelity

11. "WM/MTS": Wireless Medical Telemetry System

1.4 System Description

A. System Description

1. The in-building distributed antenna system, herein "System" or "DAS", shall reliably distribute RF signals and/or wireless services throughout the specified
frequency ranges and throughout the specified coverage spaces. The System shall be implemented based on proven state-of-the-art technology that can seamlessly integrate with the rapid evolution of wireless technologies and business applications. The System shall be flexible and shall easily accommodate additional wireless services within the System’s frequency bands without requiring significant upgrades or system modifications.

2. The System shall include subsystems, equipment, components, transmission media, connection/termination apparatus, etc., necessary for a complete operating System as described herein.

3. The DAS shall include a head end subsystem. The head end shall include a wideband transceiver and be a common interface node. The head end shall be co-located with Base Station systems from multiple cellular common carriers, with the paging system, and with the two-way radio system.

B. Design Criteria

1. Frequency Range: The System shall support all frequencies between 400 MHz to 3000 MHz.

2. The System shall distribute RF coverage at levels outlined below in the following areas of the building(s) – herein specified coverage areas:
   a. Floor areas
   b. Patient/Exam Rooms
   c. Basement
   d. Stairwells
   e. Elevators
   f. General Use spaces (break rooms, staff rooms)
   g. Mechanical/Electrical Rooms
   h. IT Rooms
   i. Restrooms

3. The System shall be able to simultaneously support the following wireless services, applications, and/or technologies:
   a. Wireless Operators, such as Nextel/Sprint, Verizon, AT&T, T-Mobile, MetroPCS:
      1) 4G - SISO
      2) LTE (700 MHz) - Verizon (4G)
      3) Cellular (850 MHz) - AT&T, Verizon (2.5G & 3G)
      4) PCS (1900MHz) - Verizon, Sprint (2.5G & 3G)
      5) iDEN (800/900MHz) – Nextel/Sprint
      6) AWS (1700/2100 MHz) - AT&T, T-Mobile, MetroPCS (3G /4G LTE)
   b. Public Safety ("First Responder")
      1) UHF (450 - 520 MHz)
      2) LMR 700/800 MHz - Land Mobile Radio
      3) Frequencies for the following radio systems shall be supported. The DAS vendor shall confirm the frequencies at the time of facility opening.
         a) Local PD
         b) City PD
         c) County Sheriff
         d) Fire Department
         e) Internal Facilities
c. SMR (800 - 900MHz) - Nextel (old Spectralink)
d. One/two way paging (900MHz)
e. Nurse Call paging or Ascom phones (900MHz)
f. Patient Telemetry / WMTS (608 MHZ/1400 MHz) – Philips
4. The System shall have the capability for separate control over each service (or wireless operator) to allow the ability to adjust and control power levels without disturbing other services.
5. The System shall support multiple services in a modular architecture so services can be added or removed without requiring new infrastructure, without readjustment of signal power levels, or disturbing existing services/operators.
6. The system shall support expansion to adjacent buildings and campus to provide a single cohesive distributed antenna system for the client.
7. The System shall enable services to be added without requiring additional cabling plant or antennas.
8. The System shall not impede any management features or functionality of any attached network and/or device management system. The System shall allow for proactive management and end-to-end alarming of active electronics. The System shall be able to engage with 3rd party SNMP-based element management systems and provide fault management information.
9. Signal strength shall be measured with a predetermined industry standard tool such as Airmagnet calibrated test equipment (or equivalent). The System shall deliver signal at the following levels:
   a) Cellular signal strength shall be -75 dBm or stronger and 10 dB higher than the cellular carriers native signal. Note that 700 MHz now requires -75 dBm MIMO 2x2 throughout the cellular coverage areas.
   b) Public safety channels should be -95 dBm or stronger as specified by any local ordinance
10. The system shall support all WiFi features & design criteria defined by the Telemetry manufacturer. At this time assume a Philips (or equivalent) telemetry system.
11. To maintain performance as usage increases, the System shall have dynamic mechanisms for adding AP capacity and segmenting the WiFi coverage into smaller areas.
12. The System shall support WiFi management applications and advanced AP features provided by the selected AP manufacturer.
13. To maintain performance as usage increases, the System shall have dynamic mechanisms for adding AP capacity and segmenting the WiFi coverage into smaller areas.
14. The System shall be FCC certified with the specific access points that are to be deployed.
15. The System shall be FDA approved.
16. The System and the associated wireless devices shall comply with FCC’s and Regional regulatory authorities emission rules for wireless devices.
C. Base Bid Work
   1. The Work under this section includes furnishing materials, installation, configuration, testing and coordination with the General Contractor with other trades for a complete, operational, and balanced System. Furnish necessary materials (i.e. cabling, electronics, and antennas), accessories, supports, fasteners, etc., and the labor and associated services required to provide the System specified herein.
      a. Work includes installation or swap-out of fiber optic connectors as required to support DAS backbone connectivity (i.e. replacing existing connectors with APC style connectors).
   2. Coordination with the DAS installation in the Services Building Replacement (SBR) Project. The DAS system in Bed Building One will provide the source for service provider connectivity to the SBR and other buildings on campus.
   4. The Work of this Section includes the following (described in greater detail in Part 3):
      a. Project management services
      b. Detailed System Design
      c. Installation and system balancing
      d. Coordination with the overall construction team and usage of pathways provided by others
      e. Manage Wireless Carrier/Service Providers’ installation and connection to System
      f. Manage Integration with Telemetry Integrator
      g. Manage Integration with 2-way radio systems Integrator
      h. Manage FCC Licensing
      i. Manage Integration with Public Safety Department
      j. Manage Integration with Telemetry Vendor
      k. System acceptance testing and turn over to Owner
   5. The work of this section requires particular attention to the following:
      a. Ceiling Types: The installer shall fully understand every ceiling type and its interaction with the System. For example, some ceiling types may impede RF signals and, subsequently, System performance.
      b. Pathways: The work of this section requires the installer fully understand the pathways and to coordinate placement of cables within those pathways.

D. Work Provided Under Another Section
   1. Primary Communications Pathways, such as backbone conduits, risers and cable tray
   2. Communications Rooms, including equipment support, power, cooling, and grounding

1.5 Submittals
A. Comply with Submittal procedural, quantity, and format requirements of Section 270000.
B. Submittal Requirements Prior To Start Of Construction:
   1. Product Data Submittal
   2. Shop Drawings Submittal: Shop drawings shall include the following information:
      a. System or functional block/line diagrams
      b. Plans indicating equipment, antenna, and/or component locations, cable routes, and other installation information – identify construction elements that would affect the System’s performance (such as metallic ceiling materials)
      c. Coverage plans, showing the design RF coverage (signal strength) for each frequency band required in 1.04 B.3
      d. Equipment and/or wall / rack elevations, showing equipment layout, space requirements and integration with other systems (outside the scope of the DAS)
      e. Installation details for antenna mounting, specialty cable hangers, and other components unique to the System, and other information that depicts the intended installation
         1) Submittal and review with Inspector of Record for compliance with project requirements for anchoring and fastening.

C. Submittal Requirements Prior To Acceptance Testing:
   1. Acceptance Testing Procedures Submittal: describes in detail the procedure for testing the System’s performance and balancing the System’s signal strength, including a description of the test data (or an example of the test report). The Contractor shall demonstrate the desired services have been successfully deployed and tested. Specifically, the DAS must be deployed with the Wireless Operators criteria and approval.

D. Submittal Requirements at Close Out:
   1. As-Built Drawings Submittal
   2. Operations and Maintenance Manual (refer to Section 270000 for contents)
   3. Integration of components and pathways into the Building Information Model (BIM).

1.6 Quality Assurance
   A. Comply with Quality Assurance requirements of Section 270000.

1.7 Delivery, Storage, and Handling
   A. Comply with Delivery, Storage and Handling requirements of Section 270000.

1.8 Warranty
   A. Warrant Work and System to perform as described within this Section for a period of 5 years, including components, electronics, etc., and coverage. Correct deficiencies within 24 hours of notification.

PART 2 - Products

2.1 Manufacturers
   A. InnerWireless
   B. Or equal system
PART 3 - Execution

3.1 General

3.2 Examination and Preparation

3.3 Installation

A. Project Management Services: The Contractor shall assign a single-point-of-contact to this project with overall responsibility for communications and ultimate delivery of contracted materials, installation, performance criteria, and services — “PM”. This PM shall be responsible for interfacing with the Owner, General Contractor, Engineer, and their own subcontractors. The PM shall present the design iterations to the Owner, coordinate cable routes with the Engineer, coordinate on-site construction activities with the General Contractor, shall manage the process to coordinate bringing wireless operators into the facility, and shall close out the project with the Owner.

B. Detailed System Design: The Contractor shall use the requirements of this Section to complete the detailed design of the System. Design shall include computer RF modeling and site surveys. The detailed design shall deliver the pre-construction submittals, including iterations for the Owner’s review and sign-off. The Contractor shall be able to show design RF signal levels to sub-room precision for all rooms within the defined coverage areas.

C. Installation: The Contractor shall coordinate the installation and schedule with the Owner and General Contractor prior to the start of installation activities. Once the Owner and General Contractor have accepted the coordination and schedule, the Contractor may proceed with installation of both DAS and wireless access points.

D. System Balancing: The Contractor shall balance the System component (e.g., antenna) signal strength to the device signal levels.

E. Active Survey: The Contractor shall perform an active wireless survey demonstrating performance according to the design criteria of Part 1 (above). From this survey, produce an active survey report, including floor plans.

3.4 Connections To System

A. Manage Wireless Operators’ Connection to System: The Contractor shall represent the Owner during negotiations with wireless operators, coordinate site preparation, assist with wireless service providers' installation, and coordinate connection of wireless service providers to the System. The Wireless Operator integration shall be turn-key. Integration includes Bi-Directional Amplifier (BDA), donor antenna, and update telecommunication drawings.

B. Manage FCC License: Acting as a representative of the Owner, obtain required licenses for operation under FCC Regulations.
Santa Clara Valley Medical Center (SCVMC) Seismic Safety Project (SSP)
Replacement Bed Building

August 11, 2011
RFP Package

C. Manage integration of telemetry services and Applications: The Contractor shall coordinate the telemetry services with the Integrator, such as telemetry applications. The Contractor shall provide equipment and components required to support the wireless services and to make adjustments to the System necessary for full operation.

3.5 Labeling

A. General Requirements
   1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner’s Representative before installation.
   2. Permanently label equipment, components, and cables. Affix label as close as practical to each end of cables.
   3. Coordinate labeling and identifier assignment with the Engineer or Owner. Submit a labeling plan to the Engineer for approval prior to labeling work.

B. Label Format
   1. Provide permanent labels with machine-generated text; hand written labels will not be accepted.
   2. Labels on cables shall fully wrap around conductors with a self-laminating feature to provide permanent marking.

3.6 System Acceptance Testing and Turn Over to Owner

A. Complete the acceptance testing as prescribed in the accepted Testing Procedures submittal.

B. Present the completed System and wireless services to the Owner, including functionality, features, ongoing maintenance, and warranty procedures. Demonstrate to Owner and Engineer system operation, including signal strength at select locations. Turn over at least 1 set of both electronic records and printed records, per the Owner’s request.

3.7 Extended Support Services

A. Provide support services for 12 months following the Owner’s acceptance of the System (for services such as integration of additional wireless operators).

3.8 Final Inspection and Certification

A. Punch the Work of this Section compliant to the requirements of Section 270000.

B. Comply with system acceptance and certification requirements of Section 270000.

3.9 System Training

A. Comply with training requirements of Section 270000.

B. For this System, provide 40 hours of training for Owner.

END OF SECTION

DISTRIBUTED ANTENNA SYSTEM
27 53 19 - 7
SECTION 27 00 00
COMMUNICATIONS BASIC REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes general administrative and procedural requirements for Division 27.

B. The requirements described herein include the following:
   1. References
   2. Definitions
   3. System Description and Existing Conditions
   4. Submittals
   5. Quality Assurance
   6. Delivery, Storage and Handling
   7. Scheduling
   8. Warranty
   9. Project Management and Coordination Service
   10. Field Quality Control
   11. Project Closeout and Record Documents

C. Related Items
   1. Section 275319 - Distributed Antenna System

1.02 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean that latest edition of such publications adopted and published prior to submittal of the bid. Consider such codes or standards a part of this Specification as though fully repeated herein.

B. Codes: Perform Work and furnish materials and equipment under Division 27 in accordance with applicable requirements of the latest edition of governing codes, rules and regulations including but not limited to the following minimum standards, whether statutory or not:

   1. United States Department Of Labor (DOL) Regulations (Standards - 29 CFR)
      a. Part 1910, "Occupational Safety and Health Standards"

   2. National Fire Protection Agency (NFPA)
      a. NFPA 70, "National Electrical Code" (NEC).
      b. NFPA 75, "Protection Of Information Technology Equipment"


5. Uniform Fire Code (UFC).


7. National, State, Local and other binding building and fire codes.

8. FCC Regulations:
   b. Part 68 – Connection of Terminal Equipment to the Telephone Network

C. Standards: Perform Work and furnish materials and equipment under Division 27 in accordance with the latest editions of the following standards as applicable:

1. Underwriter's Laboratories (UL): Applicable listing and ratings, including but not limited to the following standards:
   a. UL 1963: Communications-Circuit Accessories
   b. UL 2024A: Optical Fiber Cable Routing Assemblies

2. ANSI/TIA/EIA-568-B Commercial Building Telecommunications Cabling Standard
   a. Part 1: General Requirements


4. ANSI/TIA/EIA-606-A Administration Standard for Commercial Telecommunications Infrastructure

5. ANSI/J-STD-607-A Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
   a. TIA/EIA-758-1 Addendum No. 1

6. EIA testing standards.

7. Insulated Cable Engineers Association (ICEA):

   a. Telecommunications Distribution Methods Manual (TDMM)

D. Make a copy of each document readily available during the course of construction for reference by field personnel.

1.03 DEFINITIONS

A. The Definitions of Division 01 shall apply to Division 27 sections.

B. In addition to those Definitions of Division 01, the following list of terms as used in this specification defined as follows:

1. "Furnish": To purchase, procure, acquire, and deliver complete with related accessories.

2. "Install": To set in place, join, unite, fasten, link, attach, set up or otherwise connect together and test before turning over to the Owner, parts, items, or equipment supplied by contractor or others. Make installation complete and ready for regular operation.

3. "Provide": To furnish, transport, install, erect, connect, test and turn over to the Owner, complete and ready for regular operation. "As directed": As directed or instructed by the Owner, or their authorized representative.
5. "Identifier": A unique code assigned to an element of the Telecommunications infrastructure that links it to its corresponding record.

1.04 SYSTEM DESCRIPTION

A. In circumstances where the Specifications and Drawings conflict, the Drawings shall govern quantity and the Specifications shall govern quality.

1.05 SUBMITTALS

A. Submit required submittals to the General Contractor in the quantities and formats as required under the general contract. In the absence of requirements, provide as described in the following with reference to quantity and format.

B. Failure to comply with requirements in part or whole shall constitute grounds for rejection.

C. Submittal Description: Product Data

1. Obtain written approval from the Engineer for the product data submittal prior to materials and equipment purchase order and prior to installation.

2. Quantity: Submit product data submittals as described in Division 01. In the absence of requirements given, submit four product data submittals.

3. Format:
   a. Submit each product data on 8-1/2 x 11 inch paper.
   b. Package product data using a 3-ring binder, plastic cover, or similar.
   c. Clearly label the cover and spine of each submittal with the following information (e.g., if in a 3-ring binder, insert the submittal information in the transparent front cover and spine pockets):
      1) Client Name.
      2) Project Name and Address.
      3) Project Submittal Number.
      4) Submittal Name (e.g., "Product Data Submittal For Telecommunications Equipment Rooms").
      5) Specification Section Number (e.g., "Section 271100").
      6) Date of Submittal. Format: <month> <day>, <year> (e.g., "January 1, 2008").
      7) Contractor Name.
   d. Include a Table Of Contents at the beginning of the submittal that lists materials by article and paragraph number (e.g., "2.02 Equipment Racks").
   e. Include tabbed separators for improved navigation through the submittal.

4. Content:
   a. Cover Letter: Include a cover letter stating that the submittal is in full compliance with the requirements of the Contract Documents. Sign (and stamped, if applicable) cover letter and list items and data submitted.
   b. Product Information: Include manufacturer's technical data, product literature, "catalog cuts", data sheets, specifications, and block wiring diagrams (if necessary) to clearly describe the product's characteristics, physical and dimensional information, electrical performance data, materials used in fabrication, material color & finish, and other relevant information such as test
data, typical usage examples, independent test agency information, and storage requirements. Clearly indicate by arrows or brackets precisely what is being submitted on and those optional accessories, which are included and those which are excluded. A minimum, include products listed in Division 27. Include relevant products that will be installed, which are not listed in the specifications.

c. Seismic Calculations: Include anchorage calculations for floor mounted fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for anchors. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the City of San Jose for review and approval.

d. Resubmittals: Provide a cover letter with the resubmittal that lists the action taken and revisions made to each product submittal in response to Submittal Review Comments. No review shall take place for any resubmittal packages that is not accompanied by this cover letter. Failure to include this cover letter will constitute rejection of the resubmittal package.

D. Submittal Description: Shop Drawings

1. Obtain written approval from the Engineer for the shop-drawings submittal prior to the release of materials and equipment purchase order and prior to installation.

2. Quantity and Media: Submit shop-drawing submittals as described in Division 01. In the absence of requirements given, submit four full-size sets of shop drawings on bond or 'eco-bond'.

3. Format:
   a. Produce shop drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
   b. Use the same size drawing sheet as the drawings of the Contract Documents, and use the project title block.
   c. Text: minimum of 3/32" high when plotted at full size.
   d. Use identical symbols as those in the drawings.
   e. Screen background information
   f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.
   g. Label each sheet in the shop drawings set with the Specification Section Number (e.g., "271523").
   h. Scaling:
      1) Scale floor plans at 1/8"=1'-0".
      2) Scale enlarged room plans at 1/4"=1'-0".
      3) Scale wall elevations at 1"=1'-0".
      4) Scale rack elevations at 1"=1'-0".

4. Content:
   a. Submit shop drawings if the proposed installation differs from the Contract Documents or the design intent.
   b. Cover Letter: Accompany each shop drawing submittal with a cover letter stating that the shop drawings have been thoroughly reviewed by the Contractor and are in full compliance with the requirements of the Contract Documents.
Have the person who prepared the submittal sign (and stamped, if applicable) the cover letter and include a drawing index. Failure to comply with this requirement shall constitute grounds for rejection of submittal.

c. Drawing Information: Shop drawing submittals shall consist of floor plans, enlarged room plans, wall and rack elevations, installation details, and other aspects of the system that differ from the Contract Documents or the design intent. Use the same scales as the Drawings (e.g., 1/4" = 1' 0" for enlarged room plans).

d. Seismic Calculations: Include anchorage calculations for floor mounted fully loaded equipment racks/frames/cabinets such that it shall remain attached to the mounting surface after experiencing forces in conformance with CCR, Title 24, Table 23P, Part II and with Section 2312 "Earthquake Regulations" of the "Uniform Building Code" for Seismic Zone 4 Area, Importance Factor of 1.25. Specify proof loads for anchors. A Structural Engineer registered in the State of California shall prepare Structural Calculations, and shall wet stamp and sign them. Forward calculations to the City of San Jose for review and approval.

e. Resubmittals: Accompany resubmittals with a cover letter that lists the revisions made to each drawing in response to Submittal Review Comments. Failure to include this cover letter will constitute rejection of the resubmittal package without review.

E. Submittal Description: Record / As-Built Drawings

1. Quantity and Media: Submit shop drawing submittals as described in Division 01. In the absence of requirements given, submit four full-size sets of shop drawings on bond or 'eco-bond' and submit one set of electronic files on CD-ROM.

2. Format:
   a. Produce shop drawings using AutoCAD, or other computer design application that can save files to AutoCAD-compatible files.
   b. Use the sheet size as the drawings of the Contract Documents, and use the project title block.
   c. Text: minimum of 3/32" high when plotted at full size.
   d. Use symbols identical to the symbols shown on the Drawings.
   e. Screen background information.
   f. Plot system components (devices, cable routes, etc.) and text at a sufficient line weight to stand out against background information.

3. Content:
   a. Submit Record Drawings that fully represent actual installed conditions and that incorporate modifications made during the course of construction.
   b. Floor Plans: Scale floor plans at 1/8"=1'-0". Floor plans shall show:
      1) Locations and identifiers of telecommunications devices.
      2) Size, quantity, location, and routes of pathways (such as cable tray, cable basket, conduits, cable hangers, and other cable support devices).
   c. Rooms Drawings: Applicable rooms: BDFs, IDF. Room drawings shall show:
      1) Floor layouts – scaled at either 1/4"=1'-0" or 1/2"=1'-0", showing dimensioned placement of equipment cabinets/frames, rack bays, etc.
      2) Overhead layouts – scaled at either 1/4"=1'-0" or 1/2"=1'-0", showing dimensioned placement of overhead cable support (e.g., cable tray, cable basket, cable runway, conduit sleeves, etc.)
3) Rack elevations – scaled at 1"=1'-0", showing placement of termination and other equipment installed onto rack bays
4) Wall Elevations – scaled at 1"=1'-0", showing dimensioned placement of termination hardware (e.g., termination/crossconnect blocks)

F. Submittal Description: Operation and Maintenance (O&M) Manuals

1. Quantity: Submit quantity of O&M Manuals as described in Division 01. In the absence of requirements given, submit four O&M Manuals.

2. Format:
   a. Submit each O & M Manual in a white, 3-ring binder with front cover and spine clear pockets for insertion of the project information.
   b. Clearly label the cover of each O&M Manual with the following information:
      1) Client Name.
      2) Project Name and Address.
      3) Manual Name (e.g., “Operation And Maintenance Manual for Telecommunications Cabling System”).
      4) Date of Submittal. Format: <month> <day>, <year> (e.g., “January 1, 2008”).
      5) Contractor Name.
   c. Include a Table Of Contents at the beginning that lists the contents.
   d. Include tabbed separators for improved navigation through the manual.

3. Content:
   a. 11"x17" prints of As-Built Drawings, as described above
   b. Manufacturer’s original catalog information sheets for each component provided under applicable Section (typically, this is similar to the Product Data submittal)
   c. Warranty certificate from the manufacturer and the Contractor
   D. Manufacturer’s instructions for system or component use
   E. Instructions for maintenance and warranty issues

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications

1. Five continuous years, minimum, design and manufacture of the materials and equipment specified herein.

2. Manufacturer(s) of products and equipment specified herein shall demonstrate that they have a quality assurance program in place to assure that the specifications are met. Include in the program, at a minimum, provisions for:
   a. Incoming inspection of raw materials
   b. In-process inspection and final inspection of the cable product
   c. Calibration procedures of test equipment to be used in the qualifications of the product
   d. Recall procedures in the event that out of calibration equipment is identified.

3. Conform to government standards on quality assurance for applications within these specifications.
B. Contractor Qualifications
   1. A current, active, and valid and C7 or C10 California State Contractors License
   2. Five, minimum, continuous years experience
   3. Five, minimum, completed projects similar to scope and cost
   4. Evidence of technicians qualified for the work
   5. IBEW / CWA union affiliation

C. Materials
   1. Materials, support hardware, equipment, parts comprising units, etc., shall be new, unused, without defects and of current manufacturer, materials
   2. Use only products and applications specified in this Section, unless otherwise submitted and approved in writing.

D. Regulatory Requirements
   1. Work and materials shall conform to the latest rules of National Board of Fire Underwriters wherever such standards have been established and shall conform to the regulations of the State Fire Marshal, OSHA and the codes of the governing local municipalities. Conform Work under Division 27 to the most stringent of the applicable codes.
   2. Provide the quality identified within these Specifications and Drawings when codes, standards, regulations, etc. allow Work of lesser quality or extent. The Contract Documents address the minimum requirements for construction.

E. Project Management and Coordination Services
   1. Provide a project manager for the duration of the project to coordinate this Work with other trades. Coordination services, procedures and documentation responsibility include, but are not limited to, the items listed in this section.
   2. Review of Shop Drawings Prepared by Other Subcontractors:
      a. Obtain copies of shop drawings for equipment provided by others that require telecommunication service connections or interface with Work.
      b. Perform a thorough review of the shop drawings to confirm compliance with the service requirements contained in the Division 27 contract documents. Document discrepancies or deviations as follows:
         1) Prepare memo summarizing the discrepancy.
         2) Submit a copy of the specific shop drawing, indicating via cloud, the discrepancy.
      c. Prepare and maintain a shop drawing review log indicating the following information:
         1) Shop drawing number and brief description of the system/material.
         2) Date of the review.
         3) Name of the individual performing the review.
         4) Indication if follow-up coordination is required.
F. Drawings
1. Follow the general layout shown on the Drawings except where other Work may conflict with the Drawings.
2. Drawings for the Work within this Division are essentially diagrammatic within the constraints of the symbology applied.
3. Drawings indicate the general location of outlets. The Drawings might not expressly show conduits, sleeves, hangers, etc., but are required.

G. Role of the Owner
1. During the construction phase of the project, the Owner will work with the Contractor to provide interpretation and clarification of project contract documents, reply to (and 'process') relevant Requests for Information (RFIs), and act as an interface between the Contractor and the Owner.
2. The Owner has retained the services to observe the Work for general compliance with the Contract Documents and to ensure that the installation meets the design intent of the system.
3. In general, the Owner will participate during the construction phase as follows:
   a. Review product data and shop drawings submittals for general compliance with the contract drawings and specifications.
   b. Review changes as they arise, and confirm that the proposed solutions maintain the intended functionality of the system.
   c. Interpret field problems for Owner, and translate between Owner and Construction Team.
   d. Review the testing procedures to confirm compliance with industry-accepted practices.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery
1. Do not deliver products to the site until protected storage space is available.
2. Coordinate materials delivery with installation schedule to minimize storage time at jobsite.
3. Deliver materials in manufacturer's original, unopened, undamaged packaging and containers with identification labels (name of the manufacturer, product name and number, type, grade, UL classification, etc.) intact.
4. Immediately replace equipment damaged during shipping at no cost to the Owner, so as not to impact the construction schedule.

B. Storage and Protection
1. Store materials in clean, dry, ventilated space free from temperature and humidity conditions (as recommended by manufacturer) and protected from exposure to harmful weather conditions.
2. Comply with manufacturer's requirements for each product. Comply with recommended procedures, precautions or remedies as described in the Material Safety Data Sheets (MSDS) as applicable.
3. Maintain factory wrapping or provide a heavy canvas/plastic cover to protect units from dirt, water, construction debris, and traffic.

4. Storage outdoors covered by rainproof material is not acceptable.

5. Provide heat where required to prevent condensation or temperature related damage.

C. Handling

1. Handle materials and equipment in accordance with manufacturer's written instructions. Handle with care to prevent damage, breakage, denting, and scoring.

2. Do not install damaged materials and equipment. Replace damaged equipment at no cost to the Owner.

1.08 SCHEDULING

A. Unless otherwise specified, the construction schedules of the Sections within Division 27 may be combined into a single, overall schedule.

B. Obtain written approval from the Owner or Owner’s Representative for schedule of this Work. Ensure schedule’s coordination throughout trades related to Work.

1.09 WARRANTY

A. Render service within 24 hours of system failure notification. Note deviations or improvements to this service at the time of bid and obtain written acceptance from the Owner, or Owner’s Representative.

B. Manufacturers of the major system components shall maintain a replacement parts department and provide testing equipment when needed. Provide complete replacement parts within a 24-hour period during the warranty period.

C. Warrant installed hardware, under normal use and service, to be free of defects and faulty workmanship during the warranty period. Keep the system in operating condition at no additional material or labor costs to the Owner during the warranty period.

D. The manufacturers shall demonstrate that a quality assurance program is in place to assure that the specifications are met. Include in the program, as a minimum, provisions for:

1. Incoming inspection of raw materials

2. In-process inspection and final inspection of the product

3. Calibration procedures of test equipment to be used in the qualifications of the product

4. Recall procedures in the event that out of calibration equipment is identified.

E. Conformance to certain government standards on quality assurance may be required for some applications outlined in these specifications.
PART 2 - PRODUCTS

2.01 GENERAL

A. Materials used shall present no environmental or toxicological hazards as defined by current industry standards and shall comply with OSHA and EPA standards, other applicable federal, state, and local laws.

B. Product numbers are subject to change by the manufacturer without notification. In the event a product number is invalid or conflicts with the written description, notify the Owner/Engineer in writing prior to ordering the material and performing installation work.

PART 3 - EXECUTION

3.01 PERMITS AND INSPECTIONS

A. Obtain and pay for permits and inspections required for the Work.

B. Furnish materials and execute workmanship for this Work in conformance with applicable legal and code requirements.

C. Perform tests required herein, or as may be reasonably required to demonstrate conformance with the Specifications or with the requirements of legal authority having jurisdiction.

D. Arrange and pay for review/inspection from compliance officials responsible for enforcement of applicable codes and regulations to establish that the work is in compliance with requirements of reference codes indicated herein.

3.02 EXAMINATION

A. Conditions: Verify existing conditions, stated under other sections, are acceptable for installation in accordance with manufacturer's instructions.

B. Pathways: Verify that pathways and supporting devices, provided under other sections, are properly installed, and that temporary supports, devices, etc., have been removed.

C. Field Measurements: Verify dimensions of pathways, including length. For example, "True Tape" the conduits.

3.03 FIELD QUALITY CONTROL

A. Staffing: Provide a qualified foreman who is in charge of the Work and who is present at the job site at times Work is being performed. Supervise the work force executing the Work. Perform the installation within the restraints of the construction schedule.

B. Construction Meetings: Participate in construction coordination meetings throughout the course of construction to review the progress and to resolve issues and conflicts. Prepare and distribute meeting agenda for telecommunication issues prior to, and meeting notes after meetings in a format acceptable to the Owner. Provide the Telecommunication Contractor with the meeting notes within 3 business days following the meeting.
C. Scheduling: Keep the construction schedule current, based on the results of the construction meetings. Issue revised schedules to the General Contractor for approval. At minimum, schedule must cover critical due dates, tasks, and milestones. Prepare and issue the Telecommunication Contractor updated schedules, within 3 business days, whenever there are modifications.

D. Inspection: Perform inspection after installation. Keep areas of work accessible and notify code authorities, or designated inspectors, of work completion released for inspection. Document completion and inspection as required.

3.04 INSTALLATION

A. Complete work in a neat, high-quality manner, relative to common industry practices, and in accordance to NECA "Standard of Installation".

B. Conform to applicable federal, state and local codes, and telephone standards.

C. Coordinate the entire installation with the General Contractor, and their subcontractors, to meet the construction schedule.

D. Manufacturer's Instructions:
   1. Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions, and product carton instructions for installation.
   2. Maintain jobsite file of Material Safety Data Sheets (MSDS) for each product delivered to jobsite packaged with an MSDS.

E. Adjusting:
   1. Make changes and revisions to the system to optimize operation for final use.
   2. Make changes to the system such that defects in workmanship are corrected and cables and the associated termination hardware pass the minimum test requirements.

F. Protection
   1. Protect installed products and finish surfaces from damage during construction.

3.05 REPAIR/RESTORATION

A. Replace or repair work completed by others that you deface or destroy. Pay the full cost of this repair/replacement.

B. Punch List:
   1. Inspect installed work in conjunction with the General Contractor and develop a punch list for items needing correction.
   2. Provide punch list to Owner for review prior to performing punch walk with the Owner.

C. Re-Installation:
   1. Make changes to adjust the system to optimum operation for final use. Make changes to the system such that defects in workmanship are corrected and cables and the associated termination hardware passes the minimum test requirements.
   2. Repair defects prior to system acceptance.
3.06 CLEANING

A. Remove temporary coverings and protection of adjacent work areas. Remove unused products, debris, spills, or other excess materials. Remove installation equipment.

B. Leave finished work and adjacent surfaces in neat, clean condition with no evidence of damage.

C. Repair or replace damaged installed products.

D. Legally dispose of debris.

E. Clean installed products in accordance with manufacturer's instructions prior to Owner's, or Owner's Representative's, acceptance.

3.07 DEMONSTRATION

A. On completion of the acceptance test, schedule a time convenient with the Owner, or Owner's Representative, for instruction in the configuration, operation, and maintenance of the system.

B. Provide 2 hours, minimum, of on-site training by a factory-trained representative. Document dates and times of training, and submit a "sign in" sheet for individuals trained, as part of the close out documentation.

3.08 CERTIFICATION

A. Submit to Owner, or Owner's Representative, a written form of acceptance for signature. Complete corrections (punch list items) prior to issuing acceptance form.

END OF SECTION
SECTION 275319
DISTRIBUTED ANTENNA SYSTEM

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: In-building Distributed Antenna System, to support multiple wireless services

B. Related Sections

1. Comply with the Related Sections requirements of Section 270000

1.02 REFERENCES

A. Comply with the References requirements of Section 270000.

B. In particular or addition to the codes and standards listed in Section 270000, comply with the latest edition of the following applicable specifications and standards except as otherwise shown or specified:

1. FCC Regulations:
   a. Part 15: WLAN
   b. Part 22: 850 MHz cellular band services
   c. Part 24: Personal Communications Server
   d. Part 27: Miscellaneous Wireless Communications Services
   e. Part 90: Specialized Mobile Radio Service

1.03 DEFINITIONS

A. Definitions as described in Section 270000 shall apply to this section.

B. In addition to those Definitions of Section 270000, the following list of terms as used in this specification defined as follows:

1. "AWS": Advanced wireless services
2. "DAS": Distributed Antenna System (synonymous with in-building antenna system)
3. "iDEN": Integrated digital enhanced network
4. "LMR": Land Mobile Radio
5. "LTE": Long Term Evolution
6. "PCS": Personal communications service
7. "RF": Radio Frequency
8. "RSSI": Received signal strength indication
9. "SMR": Specialized Mobile Radio
10. "WiFi": Wireless Fidelity

11 August 2011

Page 1 of 7
1.04 SYSTEM DESCRIPTION

A. System Description

1. The in-building distributed antenna system, herein "System" or "DAS", shall reliably distribute RF signals and/or wireless services throughout the specified frequency ranges and throughout the specified coverage spaces. The System shall be implemented based on proven state-of-the-art technology that can seamlessly integrate with the rapid evolution of wireless technologies and business applications. The System shall be flexible and shall easily accommodate additional wireless services within the System's frequency bands without requiring significant upgrades or system modifications.

2. The System shall include subsystems, equipment, components, transmission media, connection/termination apparatus, etc., necessary for a complete operating System as described herein.

3. The DAS shall include a head end subsystem. The head end shall include a wideband transceiver and be a common interface node. The head end shall be co-located with Base Station systems from multiple cellular common carriers, with the paging system, and with the two-way radio system.

B. Design Criteria

1. Frequency Range: The System shall support all frequencies between 400 MHz to 3000 MHz.

2. The System shall distribute RF coverage at levels outlined below in the following areas of the building(s) – herein specified coverage areas:
   a. Floor areas
   b. Basement
   c. Stairwells
   d. Elevators
   e. General Use spaces (break rooms, staff rooms)
   f. Restrooms

3. The System shall be able to simultaneously support the following wireless services, applications, and/or technologies:
   a. Wireless Operators, such as Nextel/Sprint, Verizon, AT&T, T-Mobile:
      1) 4G - SISO
      2) LTE (700 MHz) Verizon (4G)
      3) Cellular (850 MHz) - AT&T, Verizon (2.5G & 3G)
      4) PCS (1900MHz) - Verizon, Sprint (2.5G & 3G)
      5) iDEN (800/900MHz) - Nextel/Sprint
      6) AWS (1700/2100 MHz) - AT&T, T-Mobile, MetroPCS (3G/4G LTE)
   b. Public Safety ("First Responder")
      1) UHF (450 - 520 MHz)
      2) LMR 700/800 MHz - Land Mobile Radio
      3) Frequencies for the following radio systems shall be supported. The DAS vendor shall confirm the frequencies at the time of facility opening.
         a) Local PD
         b) City PD
c) County Sheriff  
d) Fire Department  
e) Internal Facilities

c. SMR (800 - 900MHz)  
d. One/two way paging (600MHz)

4. The System shall have the capability for separate control over each service (or wireless operator) to allow the ability to adjust and control power levels without disturbing other services.

5. The System shall support multiple services in a modular architecture so services can be added or removed without requiring new infrastructure, without readjustment of signal power levels, or disturbing existing services.

6. The system shall support expansion to adjacent buildings and campus to provide a single cohesive distributed antenna system for the client:
   a. The Services Building Replacement project shall connect to the Bed Building One Project-Radio Repeater Room for connection to service provider equipment (service provider equipment will reside in the radio repeater room).

7. The System shall enable services to be added without requiring additional cable plant or antenna systems.

8. The System shall not impede any management features or functionality of any attached network and/or device management system. The System shall allow for proactive management and end-to-end alarming of active electronics. The System shall be able to engage with 3rd party SNMP-based element management systems and provide fault management information.

9. Signal strength shall be measured with a predetermined industry standard tool such as AirMagnet calibrated test equipment (or equivalent). The System shall deliver signal at the following levels:
   a. Cellular signal strength shall be -75 dBm or stronger and 10 dB higher than the cellular carrier’s native signal. Note that 700 MHz now requires -75 dBm MIMO 2x2 throughout the cellular coverage areas.
   b. Public safety channels should be -95 dBm or stronger as specified by any local ordinance

10. The System must be FCC certified with the specific access points that are to be deployed.

11. The System shall be FDA approved.

12. The System and the associated wireless devices shall comply with FCC’s and Regional regulatory authorities emission rules for wireless devices.

C. Base Bid Work

1. The Work under this section includes furnishing materials, installation, and coordination with the General Contractor with other trades for a complete, operational, and balanced System. Furnish necessary materials, accessories, fasteners, etc., and the labor and associated services required to provide the System specified herein.
a. Work includes installation or swap-out of fiber optic connectors as required to support DAS backbone connectivity (i.e. replacing existing connectors with APC style connectors).

2. Coordination with the DAS installation in the Bed Building One (BB1) Project. The DAS system in Bed Building One will provide the source for service provider connectivity to the SBR and other buildings on campus.

3. Reflected Ceiling Plan coordination with General Contractor, Owner and Architect for modeling and placement of Antennas.

4. The Work of this Section includes the following (described in greater detail in Part 3):
   a. Project management services
   b. Detailed System Design
   c. Installation and system balancing
   d. Coordination with the overall construction team and usage of pathways provided by others
   e. Manage Wireless Carrier/Service Providers' installation and connection to System
   f. Manage Integration with 2-way radio systems Integrator
   g. Manage FCC Licensing
   h. Manage Integration with Public Safety Department
   i. System acceptance testing and turn over to Owner

5. The work of this section requires particular attention to the following:
   a. Ceiling Types: The installer shall fully understand every ceiling type and its interaction with the System. For example, some ceiling types may impede RF signals and, subsequently, System performance.
   b. Pathways: The work of this section requires the installer fully understand the pathways and to coordinate placement of cables within those pathways

D. Work Provided Under Another Section
   1. Primary Communications Pathways, such as backbone conduits, risers and cable tray
   2. Communications Rooms, including equipment support, power, cooling, and grounding

1.05 SUBMITTALS

A. Comply with Submittal procedural, quantity, and format requirements of Section 270000.

B. Submittal Requirements Prior To Start Of Construction:
   1. Product Data Submittal
   2. Shop Drawings Submittal: Shop drawings shall include the following information:
      a. System or functional block/drawings
      b. Plans indicating equipment, antenna, and/or component locations, cable routes, and other installation information – identify construction elements that would affect the System's performance (such as metallic ceiling materials)
      c. Coverage plans, showing the design RF coverage (signal strength) for each frequency band required in 1.04 B.3
      d. Equipment and/or wall / rack elevations, showing equipment layout, space requirements and integration with other systems (outside the scope of the DAS)
e. Installation details for antenna mounting, specialty cable hangers, and other components unique to the System, and other information that depicts the intended installation

1) Submittal and review with Inspector of Record for compliance with project requirements for anchoring and fastening.

C. Submittal Requirements Prior To Acceptance Testing:

1. Acceptance Testing Procedures Submittal: describes in detail the procedure for testing the System's performance and balancing the System’s signal strength, including a description of the test data (or an example of the test report). The Contractor shall demonstrate the desired services have been successfully deployed and tested. Specifically, the DAS must be deployed with the Wireless Operators criteria and approval.

D. Submittal Requirements at Close Out:

1. As-Built Drawings Submittal
2. Operations and Maintenance Manual (refer to Section 270000 for contents)
3. Integration of components and pathways into the Building Information Model (BIM).

1.06 QUALITY ASSURANCE

A. Comply with Quality Assurance requirements of Section 270000.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with Delivery, Storage and Handling requirements of Section 270000.

1.08 WARRANTY

A. Warrant Work and System to perform as described within this Section for a period of 5 years, including components, electronics, etc., and coverage. Correct deficiencies within 24 hours of notification.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. InnerWireless
B. Or equal system

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with the Execution requirements of Section 270000.
3.02 EXAMINATION AND PREPARATION

A. Prior to the start of this Section’s installation Work, examine Communications Rooms and Pathways for completeness, compatibility with the Work of this section, and readiness for connections with the Work of this section.

3.03 INSTALLATION

A. Project Management Services: The Contractor shall assign a single-point-of-contact to this project with overall responsibility for communications and ultimate delivery of contracted materials, installation, performance criteria, and services — “PM”. This PM shall be responsible for interfacing with the Owner, General Contractor, Engineer, and their own subcontractors. The PM shall present the design iterations to the Owner, coordinate cable routes with the Engineer, coordinate on-site construction activities with the General Contractor, shall manage the process to coordinate bringing wireless operators into the facility, and shall close out the project with the Owner.

B. Detailed System Design: The Contractor shall use the requirements of this Section to complete the detailed design of the System. Design shall include computer RF modeling and site surveys. The detailed design shall deliver the pre-construction submittals, including iterations for the Owner's review and sign-off. The Contractor shall be able to show design RF signal levels to sub-room precision for all rooms within the defined coverage areas.

C. Installation: The Contractor shall coordinate the installation and schedule with the Owner and General Contractor prior to the start of installation activities. Once the Owner and General Contractor have accepted the coordination and schedule, the Contractor may proceed with installation of both DAS and wireless access points.

D. System Balancing: The Contractor shall balance the System component (e.g., antenna) signal strength to the device signal levels.

E. Active Survey: The Contractor shall perform an active wireless survey demonstrating performance according to the design criteria of Part 1 (above). From this survey, produce an active survey report, including floor plans.

3.04 CONNECTIONS TO SYSTEM

A. Manage Wireless Operators’ Connection to System: The Contractor shall represent the Owner during negotiations with wireless operators, coordinate site preparation, assist with wireless service providers’ installation, and coordinate connection of wireless service providers to the System. The Wireless Operator integration shall be turn-key. Integration includes Bi-Directional Amplifier (EDA), donor antenna, and update telecommunication drawings.

B. Manage FCC License: The Contractor shall represent the Owner to obtain required licenses for operation under FCC Regulations.

3.05 LABELING

A. General Requirements

1. Labeling, identifier assignment, and label colors shall conform to TIA/EIA-606-A Administration Standard and as approved by Owner’s Representative before installation.
2. Permanently label equipment, components, and cables. Affix label as close as practical to each end of cables.
3. Coordinate labeling and identifier assignment with the Engineer or Owner. Submit a labeling plan to the Engineer for approval prior to labeling work.

B. Label Format
1. Provide permanent labels with machine-generated text; hand written labels will not be accepted.
2. Labels on cables shall fully wrap around conductors with a self-laminating feature to provide permanent marking.

3.06 SYSTEM ACCEPTANCE TESTING AND TURN OVER TO OWNER
A. Complete the acceptance testing as prescribed in the accepted Testing Procedures submittal.
B. Present the completed System and wireless services to the Owner, including functionality, features, ongoing maintenance, and warranty procedures. Demonstrate to Owner and Engineer system operation, including signal strength at select locations. Turn over at least 1 set of both electronic records and printed records, per the Owner's request.

3.07 EXTENDED SUPPORT SERVICES
A. Provide support services for 12 months following the Owner's acceptance of the System (for services such as integration of additional wireless operators).

3.08 FINAL INSPECTION AND CERTIFICATION
A. Punch the Work of this Section compliant to the requirements of Section 270000.
B. Comply with system acceptance and certification requirements of Section 270000.

3.09 SYSTEM TRAINING
A. Comply with training requirements of Section 270000.
B. For this System, provide 40 hours of training for Owner.

END OF SECTION