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PART 1 – GENERAL

1.1 SCOPE

- A. The Contractor shall provide a wireless local area network (WLAN) conforming to the 802.11a, g, n and ac both in the 2.4 and 5 GHZ bands throughout the designated coverage area (s) Wi-Fi technologies as specified herein and indicated in the Drawings.
- B. The designated coverage areas shall include both indoor and outdoor coverage.

1.2 RELATED SECTIONS

- A. 27 17 52 "Copper and Fiber Optic Communications
- B. 27 17 51 "Communications Infrastructure

1.3 QUALITY ASSURANCE

- A. Contractor Qualifications:
 - 1. Minimum Experience & Qualifications Reference RFQQ 4.3.1 and adhere to the following:
 - a. The Contractor performing the work of this section shall have demonstrated ability installing Aruba networks with the equipment specified and shall have been in the wireless network installation business for a minimum of five (5) years.
 - b. The Contractor performing the work of this section shall have successfully completed five (4) wireless communications projects consisting of at least 35 access points, projects shall have been successfully integrated into a network consisting of no fewer than 400 access points, within the previous three (3) years, with the similar equipment specified herein,
 - c. Contractor performing the work of this section shall ensure and warrant that all installations meet the manufacture's specifications and all applicable requirements, standards and regulations from the UW, local, state or federal agencies.
 - d. The Contractor performing the work of this section shall employ individuals who are fully familiar with and qualified to install Aruba equipment and have the capability to complete the installation and provisioning process as described herein.
 - e. Only full-time permanent employees of the Contractor performing the work of this section shall install the work of this Section.
 - f. The Installation Firm shall provide all needed software and shall have staff proficient in the use of layered AutoCAD Design for incorporation into AutoCAD
- B. Project Meetings:

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1. Pre-installation meeting: Early in the construction time line if required, the Contractor shall schedule a pre-installation meeting to include the Owner's Representative, UWIT Wi-Fi Engineer and the Wi-Fi Designer (ACMP), where communications infrastructure installation issues shall be discussed. This meeting may coordinated with or be part of the Pre-installation walk-through.
2. Pre-installation walk-through: Prior to commencing installation, the Contractor shall coordinate a pre-installation walk-through with the Owner's UW-IT Wireless Engineer and all trades related to installation of the wireless communications systems.
 - a. The walk-through shall address installation of penetrations, sleeves, conduit, cable tray, grounding and bonding, and electrical power and other building support infrastructure requirements.
 - b. The Lead or Forman for the Contractor performing the work of this section who will be on site for the execution of the project shall be at this walk-through.
 - c. At Owner's sole discretion, this walk-through may occur as part of the pre-construction meeting.
3. Construction meetings: During the scheduled time period of the Wi-Fi installation the Wi-Fi installation contractor shall have a representative at the weekly (or as often as they occur) construction meetings.

1.4 SPECIAL COORDINATION

- A. The Contractor shall coordinate with the A/E and Owner throughout the project to provide information in the installer portion of the Owner's Wi-Fi Information Form (Google Spreadsheet).
 1. Contact the Owner's Representative to receive access to this form.

1.5 SUBMITTALS

- A. The Contractor shall submit evidence to Owner of Contractor Qualifications meeting the requirements of section 1.3 upon award of the contract for the work of this section or when any change in personnel, for whom these certifications are required, takes place.
- B. Prepare and submit CAD as-built drawings. The as-built should be based upon the UW-IT file provided to the designer. Include:
 1. Floor plans indicating location of the wireless equipment.
 - a. Note any changes from the design documents and show as-built location of all equipment.
 - b. Each AP shall have a unique name in the format CCC.RRRR.APyy where:

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- (1) CC is the Owner's building code, in all capital letters (e.g., SAV for Savery Hall and UMSS for the SS Wing of UWMC). This code is found on the Owner's Wi-Fi Information Form.
 - (2) RRRR is the room number, indicated on the Contract Drawings, wherein the AP is located.
 - (3) yy is a two digit incrementing integer for each AP within a room, beginning with 01. (Sample AP names include: HMC.12EH-04.1.AP01; HUB.203.AP01; HUB.203.AP02; HSJ.J100S.AP01; WCH3.100B.AP01)
- C. For Substantial Completion, submit O&M Manual information required by RFQQ 5.3.10, RFQQ 5.6.2, and RFQQ 5.7.5.

1.6 SUBSTITUTIONS

- A. Product substitutions will only be considered with complete product descriptions including technical data and performance records and approval by UW-IT.

PART 2- PRODUCTS

2.1 WIRELESS ACCESS POINTS (APs)

Wireless Access Points will be Owner furnished and are included here for reference and coordination purposes.

- A. Indoor wireless APs
1. Aruba AP-214, or
 2. Aruba AP-215 or
 3. Aruba AP-224 or
 4. Aruba AP-225
 5. No Substitutions unless approved by UW-IT
- B. Outdoor wireless APs
1. Aruba AP-274, or
 2. Aruba AP-275 or
 3. Aruba AP-277 or

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4. Aruba AP-214 or
5. Aruba AP-224 or
6. Aruba AP-215 or
7. Aruba AP-225
8. No Substitutions for Aruba products unless approved by UW-IT

2.2 AP ANTENNA

Wireless Access Points Antenna will be Owner furnished and are included here for reference and coordination purposes.

- A. Provide an antenna that demonstrates Aruba AP-compatibility.
- B. No Substitutions for Aruba products unless approved by UW-IT

2.3 AP INDOOR MOUNT KITS (BRACKETS) AND ENCLOSURES

Aruba Wireless Access Mount Kits will be Owner furnished and are included here for reference and coordination purposes.

- A. Suspended ceilings
 1. Aruba AP-220-MNT-C2
 2. No Substitutions for Aruba products unless approved by UW-IT
- B. Wall or hard ceilings
 1. Aruba AP-220-MNT-W2
 2. No Substitutions for Aruba products unless approved by UW-IT
- C. Partially recessed horizontal mounting kits (hard lid and acoustic tile)
 1. Aruba ap-220-mn-t, for use with AP 215 & AP-225 (Owner Furnished)
 2. Oberon 1042-AP215 (Contractor Furnished)
 3. Oberon 1042-AP225 (Contractor Furnished)
 4. Or approved equal (Contractor Furnished)
- D. Horizontal Bracket Mounts for Aruba APs (Contractor Furnished)
 1. Oberon Model 1009-00
 2. Or approved equal
- E. Polycarbonate enclosure for interior APs in wet areas. (Contractor Furnished)

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1. Oberon 1020-00
 2. Or approved equal
- F. Polycarbonate enclosure for interior APs at under seat Areas.. (Contractor Furnished)
1. Oberon 1020-00
 2. Or approved equal

2.4 AP OUTDOOR ENCLOSURES

Enclosures shall be furnished under this construction contract.

- A. Install outdoor access points in a NEMA 4X/IP66 enclosure on the exterior of building. Box dimensions shall be sufficient to permit easy access for service and subsequent removal.
 1. Oberon 1020-00
 2. Or approved equal

2.5 AIR MONITORS (AMs)

Wireless Air Monitors will be Owner furnished and are included here for reference and coordination purposes.

- A. Aruba AP-224, or
- B. Aruba AP-225
- C. Aruba AP-214, or
- D. Aruba AP-215
- E. No Substitutions for Aruba products unless approved by UW-IT

PART 3- EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The installed AP equipment must provide coverage for 802.11a, g, n and Wi-Fi technologies (with a maximum Standard Noise Reduction of 25dB and a minimum receive signal strength (Power Threshold) of -65 dBm) throughout the designated coverage area(s).
 1. All areas designated for coverage shall provide sufficient cell overlap such that users can roam through the area(s) of coverage without loss of connectivity.
 2. Each Client should see a minimum of 2APs at the same time while receiving a minimal signal strength of -70 dBm..
 3. Capacity coverage:

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- a. The estimated occupancy for this project will be provided in users in total per coverage area. Users per specific areas should be represented as well when capacity considerations are being met.
- b. Within coverage areas, APs shall be installed to accommodate a maximum of 20 users per AP.
- c. If the user density exceeds 16 sq. ft. per user, a special layout may be required beyond the 20 users per AP criteria. The following information is provided to assist the Contractor in this circumstance:
 - 1) 5 GHz DFS channels shall be used upon confirmation that building and occupant systems support them.
 - 2) 20 MHz channel width will be used in the 2.4 GHz band.
 - 3) 20 MHz channel width is generally used in the 5GHz band, but 40 MHz channel can be recommended and used with the Owner and UWIT Wi-Fi engineer's approval.
 - 4) Co-Channel interference shall be minimized with a goal of no more than one AP seen on any channel with signal strength of -80 dBm or higher. IF more than 2 APs are seen on a single channel the Owner and UWIT Wi-Fi engineers shall be contacted for direction.
 - 5) If the design provided appears to vary from any of these requirements report the discrepancy to the Owner.
 - 6) Access points shall meet the above with power levels set to a maximum of 9 dBm on 2.4 GHz band and 18 dBm on 5GHz band.

B. Air Monitors (AMs):

2. Install one (1) AM for every five (5) to seven (7) APs on a floor, such that monitoring coverage is provided for the entire area in both bands.
3. AMs shall be placed as indicated on Drawings but never directly adjacent to APs.

3.2 INSTALLATION

- A. Unless otherwise indicated, APs shall be mounted between 8 and 10 feet above finished floor.
1. Wall mounted APs shall be installed with a minimum 6 inches of clearance between the top of AP and the ceiling.

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2. APs installed on suspended ceilings shall attach to the main runner (rather than cross tees).
3. All alternative placements shall be approved by the Owner prior to installation.

3.3 EQUIPMENT LABELING

- A. To each AP/AM affix label(s) which include at a minimum the following information (see the Wi-Fi Information Form):
 1. The AP/AM name, matching the configured name of the device.
 2. The University of Washington asset inventory tag number designated by the Owner for each AP/AM.

END OF SECTION