



**COMMONWEALTH OF VIRGINIA
STANDARD CONTRACT**

Contract No. UCPJMU7436

This contract entered into this 7th day of May 2026, by Morcom International Inc., hereinafter called the "Contractor" and Commonwealth of Virginia, James Madison University called the "Purchasing Agency".

WITNESSETH that the Contractor and the Purchasing Agency, in consideration of the mutual covenants, promises and agreements herein contained, agree as follows:

SCOPE OF CONTRACT: The Contractor shall provide the services to the Purchasing Agency as set forth in the Contract Documents.

PERIOD OF PERFORMANCE: From May 7, 2026 through May 6, 2027 with nine (9) one-year renewal options.

The contract documents shall consist of:

- (1) This signed form;
- (2) The following portions of the Request for Proposal RFP KBF-1239 dated October 30, 2025.
 - (a) The Statement of Needs,
 - (b) The General Terms and Conditions,
 - (c) The Special Terms and Conditions together with any negotiated modifications of those Special Conditions,
- (3) The Contractor's Proposal dated December 7, 2025 and the following negotiated modification to the Proposal, all of which documents are incorporated herein.
 - (a) Negotiations Summary, dated March 9, 2026

IN WITNESS WHEREOF, the parties have caused this Contract to be duly executed intending to be bound thereby.

CONTRACTOR:

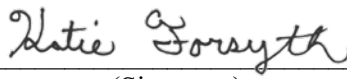
By: 
(Signature)

Cyrus Namazi

(Printed Name)

Title: President

PURCHASING AGENCY:

By: 
(Signature)

Katie Forsyth

(Printed Name)

Title: Buyer Senior

**RFP # KBF-1239 Public Safety Distributed Antenna System (DAS)
Negotiation Summary for Morcom International Inc.
March 9, 2026**

1. Parties agree that items within this Negotiation Summary modify RFP# KBF-1239 and the Contractor's response to RFP# KBF-1239 and that this Negotiation Summary takes precedence in conflict.
2. For the avoidance of doubt, this contract establishes a vehicle for project work by future mutual agreement on statements of work by request of the agency. There is no guarantee of a particular project purchase or spend under this award.
3. Revised pricing
 - a. Morcom shall waive all credit card fees for purchases under the contract.
 - b. All project purchases for turnkey design purchased under this contract shall have a one year warranty included when quoted and pricing for extended warranty provided as optional.
 - c. Prospective project pricing at university request shall display any discount off list for equipment as applicable, not to be priced at cost plus models under VA code.
 - d. Will-Call Time and Material Rates

Category/Item	Standard Rate
Program Manager	\$145.00
Quality Control Manager	\$125.00
Cabling Manager	\$114.47
Administrative	\$80.00
Engineering	\$125.00
PIM Testing Rate (per test)	\$50.00
Cabling Technician-Fiber	\$107.00
Cabling Technician-Coax/other	\$107.00
Equipment Installer	\$107.00
Journeyman	\$107.00
Program Manager	\$145.00

4. All quotes, SOWs, etc. shall list the breakdown of hours, rate per labor category, and itemized materials with quantity and cost as agreed upon in this contract instead of as one total labor charge.
5. Contractor agrees that all exceptions taken within their initial response to RFP# KBF-1239 that are not specifically addressed within this negotiation summary are null and void.
6. Contractor has disclosed all potential fees. Additional charges will not be accepted.



Morcom International Inc.

44427 Atwater Drive, Suite 140
Ashburn VA, 20147

www.morcom.com



PUBLIC SAFETY DISTRIBUTED ANTENNA SYSTEM (DAS)

RFP #KBF-1239 – Technical

Proposal December 10, 2025

Abstract

This proposal demonstrates that Morcom is a qualified contractor to provide equipment and technically skilled, experienced personnel to provide RF and telecommunications products, systems and services.

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III. EXECUTIVE SUMMARY

Brief overview of Morcom International’s capabilities and commitment to JMU’s public safety DAS objectives.

Morcom International, Inc. (Morcom) is a company that specializes in the design, deployment, and support of wireless systems for critical applications. With over 41 years of experience and hundreds of successful projects completed, Morcom is particularly well qualified to handle projects that involve critical communications, Public Safety, Neutral Host DAS design and deployments, or that apply to government and institutional type use.

For this RFP, Morcom fully understands the James Madison University’s need to identify a reliable contractor to provide Public Safety Distributed Antenna Systems (PS DAS) installation and maintenance services. Morcom is a Virginia company classified as a DBE under the state of Virginia. It has an outstanding record providing the same types of services to counties and other local government entities in Virginia and in other states.

Morcom’s unique ability to address and align its services to specific customers will be of significant benefit to JMU. We will assign a principal engineer and as many specialized technicians as necessary to serve JMU’s needs to its full satisfaction.

We include a table of our business information to assist in your due diligence.

Morcom’s BUSINESS INFORMATION	
DUNS Number	139363766
TIN	
CCR Cage Number	07CG5
DBE Certification	DBE0002295
Location of Headquarters	Morcom International, Inc. 44427 Atwater Drive, Suite 140 Ashburn, VA 20147
Small Business	100%
Virginia Class A License #	2705120123
Number of Years in Business	41 years
GSA Contract	GS-35F-026DA

Our company is vendor agnostic and always offers the best solution for each customer’s application. We have analyzed the requirements JMU has included for both the existing systems and the potential new systems, and laid out our capabilities within this response.

IV STATEMENT OF NEED

A. General Requirements

1. Company Overview and Experience

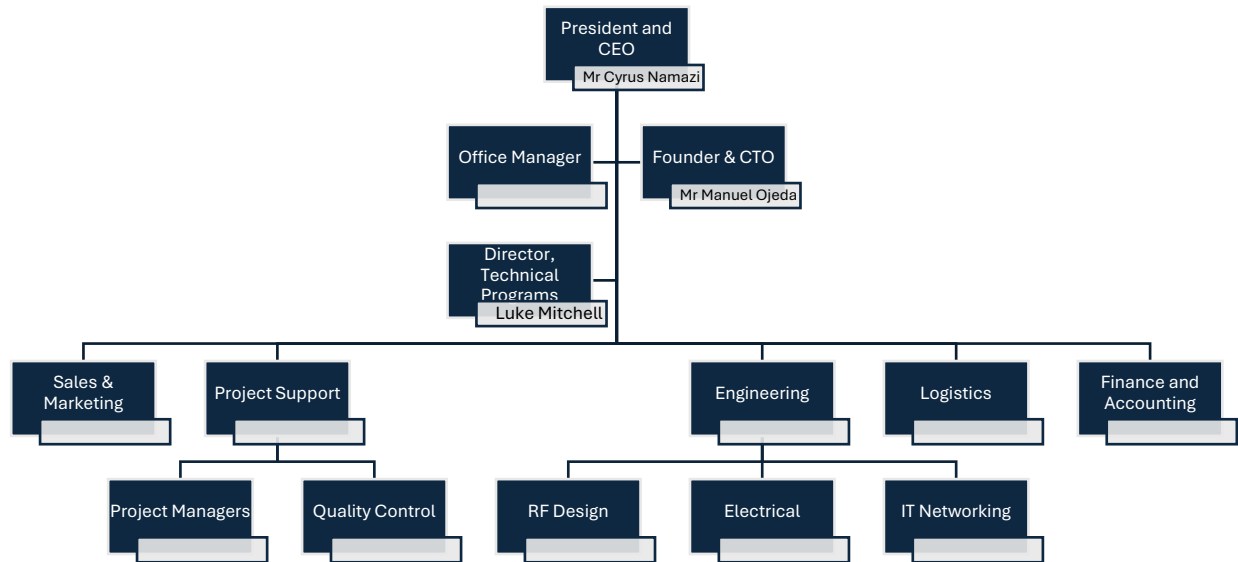
Morcom International, Inc. specializes in the turn-key deployment and ongoing support of complex wireless systems. With over 41 years of experience and a record of accomplishments through hundreds of successful projects, Morcom is highly qualified to deliver projects involving critical communications, DAS design and service support for JMU’s complete requirement.

Morcom’s unique capability to tailor its services to meet specific customer requirements will significantly benefit JMU. We will work closely with you throughout all project stages, assigning a highly qualified Project Manager, Principal Engineer, and the necessary specialized technicians to fully meet JMU’s ongoing needs according to the requirements and technical specifications provided, as well as any that may arise. We will closely monitor and communicate Project Risk, Quality, Cost, and Schedules to ensure that the highest standards are met to your complete satisfaction. Morcom has been providing design, installation, and support services of critical communication systems to Federal Government, State Agencies as well as academic and commercial customers for over 41 years. Some of Morcom’s customers include:

Government Services	Private Sector Services
Federal Government Agencies - Architect of the Capitol - U.S. Air Force - U.S. Coast Guard - U.S. Department of Commerce - U.S. Navy State Government Agencies - Arlington County (VA) - DC Water - Loudoun County (VA) - Montgomery County (MD) - Prince William County (VA) - Smyth County (VA) - Virginia Department of Transportation (VDOT)	Commercial Clients - Accenture - Alexander T. Augusta Military Medical Center - CB&I Areva - Harris Corporation - HITT Construction - Kiewit Construction - Clark Construction - M.C. Dean - Parsons - Pavion International Clients - CEPA - COCESNA - CORPAC - International Civil Aviation Organization (ICAO) - United Nations Office for Projects (UNDP)

Morcom International has a strong track record of delivering successful projects involving radio and digital communications systems. This includes evaluating existing networks, identifying and resolving system faults, and designing, implementing, and supporting a wide range of technologies—from cellular and public safety DAS to Wi-Fi, LAN, aeronautical, and private broadband infrastructures. Our expertise covers all critical disciplines necessary for executing complex communications projects, and we are committed to recruiting and retaining qualified personnel to support these efforts.

The chart below shows the Morcom company structure. Morcom is a close-knit team and weekly internal project meetings with all staff, make sure full support is given to ensure successful completion of projects.



2. Staff Certifications and Qualifications

While Morcom’s president and founder both maintain an active role in the management of all major projects, our Director of Technical Programs will take the lead to ensure JMU receives the best possible service. For each deliverable staff from the appropriate business arm will assist the program manager plan, communicate and deliver the required services, from routine maintenance to complex installation, the team below will head up each functional area.

Mr. Luke Mitchell.

Director, Technical Programs

(Project manager, Senior Wireless engineer, QA and Data Control Manager)

Undertaking the overall project management and stakeholder co-ordination of the contract and any subsequent requirements, with high-level overview of all activities and deliverables. With over 25 years’ experience of delivering projects to PRINCE2, PMP v.6, and AGILE methodologies, as well as ITIL v.4 for service delivery, he has conducted hundreds of successful projects around the world for public safety, the scientific community, satellite installations, government and secure projects and over 100 RF-based projects in the DMV alone, in the last 7 years. This breadth of experience does not come without understanding that assigning the ideal individuals for technical roles is critical. Luke has either conducted engineering, design and planning or managerial actions for all stipulated tasks, and supported by the Morcom team is highly capable of bringing any technical project to a successful conclusion.

Mr. Gideon C.

Technical Project Manager

(Project manager, QA manager, Data Management Supervisor)

Highly experienced in the delivery of projects of this type, Gideon will undertake the day-to-day management of projects and thanks to his vast national experience in the public safety communications industry, will be

instrumental in the design, scheduling and equipment specifications of future proposals, and the selection of the technical implementation team.

Mr Eric O.
Senior RF Design Engineer
(Senior Wireless Systems Technician, Network Design Engineer)

Eric has extensive experience and qualifications in the design, testing and propagation calculations for highly complex and critical communication systems. His past projects include public safety networks for Dulles and Norfolk Airports and over 20 builds for the Office of Unified Communications (OUC) Washington DC.

Kossi D.
Technical Supervisor
(Wireless Systems Technical Supervisor, Tower technician)

Following his degree and apprenticeship, Kossi dedicated his professional career to the installation of communication systems for a data center and computer systems installation company, installing, terminating and testing a minimum of 100 connections per day. First gaining his BICSI certification in 2012, Kossi has completed dozens of unique systems for Morcom international and hundreds through his career. A calm and likeable leader and data system professional.

This team is supported by Morcom's staff of between 40-50 personnel, which includes master electricians, coax, copper and fiber installers, logistics, administrative, engineering and project management professionals, as well as the local management team.

Relevant certifications of the team are included below in section VII.

3. Service Agreement and Licensing Language

A word copy of our service agreement is included as part of our submission.

4. Subcontractors and SWaM Reporting Plan

Morcom International Inc. confirms that no subcontractors will be used in the fulfillment of this contract. All design, installation, testing, commissioning, and maintenance activities will be performed exclusively by Morcom's in-house personnel, ensuring complete control over quality, safety, and schedule adherence. As no subcontracted scope is anticipated, no SWaM reporting or third-party references apply under this requirement.

5. Ability to Furnish Labor, Tools, Equipment, and Testing Devices

Morcom International Inc. possesses the full capability to furnish all labor, supervision, tools, labeling materials, and specialized testing and certification equipment necessary to install, maintain, and repair Public Safety Distributed Antenna Systems (PS DAS).

Our field operations are supported by experienced and certified technicians trained in RF engineering, DAS installation, and system commissioning. Each project is led by a dedicated on-site supervisor who ensures adherence to project specifications, safety protocols, and JMU performance standards.

Morcom maintains a complete inventory of professional-grade tools and calibrated test instruments, including spectrum analyzers, signal generators, OTDRs, fiber inspection scopes, network analyzers, and cable certifiers, all with current calibration certificates. We also carry full labeling and documentation equipment compliant with TIA-606-C standards for cable and component identification.

This comprehensive in-house capability enables Morcom to execute the full lifecycle of PS DAS work, from initial installation and optimization to long-term maintenance and emergency repair, without reliance on external labor or equipment rentals, ensuring efficiency, accountability, and consistent quality control.

6. Equipment Inventory and Calibration Certificates

Morcom International Inc. maintains a comprehensive inventory of professional-grade tools and test equipment specifically suited for the design, installation, commissioning, and maintenance of Public Safety DAS systems.



Master List of Measuring and Test Equipment

Item	Manufacturer	Model	Serial Number	Certificate Number	Calibration Date	Calibration Due	Status
1	Fluke	77	58470705	710812	02-17-2025	02-17-2026	Ok
2	Marconi	2022D	119162/040	710815	02-17-2025	02-17-2026	Ok
3	Anritsu	S332D	0941129	714830	07-31-2025	07-31-2026	Ok
4	Leader	8104	2617039	711990	04-09-2025	04-09-2026	Ok
5	Wattmeter (Bird)	43 w/6 Elements	144600064	709018-1-7	12-02-2024	12-02-2025	Ok
6	Motorola	R2670A	496KZW0043	708246	11-07-2024	11-07-2025	Ok
7	Daiwa	CN-801	1901	709021	12-06-2024	12-06-2025	Ok
8	Kenwood	PD18-20	7100012	708245	11-11-2024	11-11-2025	Ok
9	Praxsym	310-010108-008(PST)	0928-001	710813	02-18-2025	02-18-2026	Ok
10	AEA Technology	20/20 TDR	0047	710814	02-18-2025	02-18-2026	Ok
11	EXFO	FPM/FLS-300	535139/514062	714826/714827	08-27-2025	08-27-2026	Ok
12	SKYSHL OTDR	SS305T	02252601	712455	04-25-2025	04-25-2026	Ok
13	VIAVI Solutions (JDSU)	JD785B	FED51895/577 10171600726	716725/716859	10-01-2025/ 10-13-2025	10-01-2026/ 10-13-26	Ok
14	MPJA	9333-PS	043944	710816	02-17-2025	02-17-2026	Ok
15	Fluke Network	Cable IQ	3364070	714828	07-31-2025	07-31-2026	Ok
16	Amprobe	Megatest1 AMB-45	180201742	708247	11-11-2024	11-11-2025	Ok
17	PCTEL	08900-E IBFLEX	81912022	672100-BF	11-22-2023	11-22-2025	Ok
18	BK Precision	2650A	42101031477	714829	07-31-2025	07-31-2026	Ok
19	FLUKE	1587	60020099/5803 0809	709022/709024	12-02-2024	12-02-2025	OK
20	FLUKE	62	59221432MV	709023	12-02-2024	12-02-2025	OK
21	Anritsu	S332E/ Option 10	2251015	709020	12-04-2024	12-04-2025	OK
22	Anritsu	OSLN50 A-8	2146625	711989	04-10-2025	04-10-2026	OK
23	Fluke	1630	35180024-E	709019	12-02-24	12-02-25	OK
24	Gear Wrench	85062M	401254644	715015	7-31-25	7-31-26	OK

7. Work Hours and Flexibility

Morcom International Inc. fully acknowledges and accepts James Madison University's standard working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding recognized holidays. Morcom is fully capable of performing

work during these hours and maintaining coordination with university staff to minimize disruption to ongoing operations.

In addition, Morcom is accustomed to supporting capital construction projects with variable schedules and is prepared to accommodate flexible workdays, evening or weekend shifts, and adjusted work weeks when dictated by the project's General Contractor or JMU's construction schedule. Our project managers routinely coordinate with other trades to meet compressed timelines and milestone deadlines, ensuring that all deliverables are completed safely, efficiently, and within the required schedule.

Morcom's field teams are cross-trained and equipped to adapt quickly to schedule changes, enabling seamless integration into multi-phase construction environments and fulfilling JMU's operational and safety requirements without interruption.

8. Change Order Process and Sample Form

Morcom International Inc. maintains a strict and transparent change order management process based on PMP v.6, to ensure full compliance with James Madison University's contractual and financial requirements.

All changes to the defined project scope are initiated only upon written authorization from JMU Telecommunications and are documented through a formal change order request. Each change order identifies the reason for the modification, a detailed description of the scope adjustment, associated labor and material impacts, and any resulting schedule adjustments.

Upon JMU's review and written approval, the change order becomes an amendment to the original scope of work. No additional work outside the approved scope is performed without prior written authorization.

Morcom's invoicing process aligns directly with this policy, invoices include copies of all executed change orders and are reconciled against the corresponding project tracking documentation to ensure accuracy and auditability. A sample of Morcom's Standard Change Order Form is provided below. This form includes fields for project identification, scope description, cost summary, authorization signatures, and approval dates, maintaining a clear record of all contractual changes for both parties.

Standard Change Request Form (PMP v.6 compliant)

Change Request	
Project:	Date:
Change Requestor:	Change No:
Change Category (Check all that apply): ☐ Schedule ☐ Cost ☐ Scope ☐ Requirements/Deliverables ☐ Testing/Quality ☐ Resources	
Does this Change Affect (Check all that apply): ☐ Corrective Action ☐ Preventative Action ☐ Defect Repair ☐ Updates ☐ Other	
Describe the Change Being Requested:	
Describe the Reason for the Change:	
Describe all Alternatives Considered:	
Describe any Technical Changes Required to Implement this Change:	
Describe Risks to be Considered for this Change:	
Estimate Resources and Costs Needed to Implement this Change:	
Describe the Implications to Quality:	
Disposition: ☐ Approve ☐ Reject ☐ Defer	
Justification of Approval, Rejection, or Deferral:	

Change Board Approval:		
Name	Signature	Date

9. Productive Time and Labor Billing Compliance

Morcom International Inc. fully acknowledges and accepts James Madison University's policy that compensation under this contract will apply only to productive time spent performing work on the job site.

Morcom's internal timekeeping and project management systems are structured to ensure that all labor billed reflects on-site, active work directly related to contract deliverables. Time associated with employee transportation, equipment handling or delivery, meal breaks, or any other non-productive activity is strictly excluded from billable hours.

Supervisors and project managers review and approve daily time logs before submission to verify accuracy and compliance. This approach guarantees transparent billing practices and aligns Morcom's labor accounting fully with JMU's contractual requirements.

10. Material Staging and Transport Capability

Morcom International Inc. confirms its full ability and commitment to meet James Madison University's requirements for material storage, inventory management, and on-site delivery.

When secure staging space is provided by JMU, Morcom will implement its standard material control and inventory procedures, based on our ISO9001 certification, to ensure all equipment and components remain properly logged, protected, and traceable throughout the project lifecycle. Each shipment received will be inspected, documented, and recorded in Morcom's inventory tracking system, with materials clearly labeled by project and location.

Morcom maintains experienced logistics and field personnel who are responsible for transporting materials from Morcom to JMU, then from JMU's storage facility to the active job site in accordance with the approved project schedule. All handling will follow manufacturer recommendations and JMU safety protocols to prevent damage, loss, or disruption to university operations.

This approach ensures complete accountability for all project materials, from initial delivery and staging through installation and final acceptance, fulfilling both JMU's security expectations and Morcom's own internal quality control standards.

11. Site Cleanliness and Housekeeping Procedures

Morcom International Inc. fully adheres to James Madison University's requirements for maintaining a clean, safe, and organized project environment throughout the duration of all work.

Morcom's field teams are trained to implement daily housekeeping practices that include removal and lawful disposal of all debris, packaging, and installation waste at the end of each workday. Work areas are kept clear of obstructions to ensure safe access for university personnel, contractors, and emergency egresses at all times, in line with OSHA standards and implemented by OSHA trained supervisors and staff.

When ceiling tiles or other building finishes must be temporarily removed to facilitate cabling or antenna installation, Morcom technicians will carefully remove, label, and store each tile during the day's work and return all materials to their original condition and placement before close of business.

These practices are reinforced through Morcom's internal quality and safety policies, ensuring that JMU facilities remain fully operational, tidy, and compliant with university safety and appearance standards throughout the project.

12. Safety Program and OSHA Compliance

Morcom International Inc. maintains a comprehensive Health, Safety, and Environmental (HSE) program that meets or exceeds all applicable OSHA standards and industry best practices for telecommunications and construction environments.

All Morcom employees and subcontractors are required to complete safety orientation and training prior to beginning work on any project site. This includes, but is not limited to, instruction in fall protection, confined space entry, electrical safety, ladder and lift use, hazard communication, and personal protective equipment (PPE) requirements.

Morcom will fully participate in any JMU or General Contractor-led safety training sessions and will integrate JMU's specific site safety policies into its own project safety plan. Each project will have a designated site safety supervisor responsible for monitoring compliance, conducting daily safety briefings, and ensuring all work activities are performed safely and in accordance with JMU and OSHA regulations.

Through this disciplined and proactive approach, Morcom ensures a safe work environment for all personnel, minimizes risk to university operations and property, and maintains complete adherence to all regulatory and contractual safety obligations.

B. New Installations

1. Design Capabilities and Process

a. Offeror's ability to design and install systems

Morcom International Inc. confirms its full ability to design, engineer, and install Public Safety DAS systems in complete accordance with the James Madison University Public Safety DAS Design Specifications outlined in Attachment F. Our engineering, installation, and commissioning teams are thoroughly experienced in adhering to structured design standards, code-compliant system requirements, and performance criteria consistent with JMU's specifications.

Morcom routinely delivers PS DAS solutions that meet or exceed the technical, safety, documentation, and commissioning requirements defined in Attachment F, and we are fully prepared to apply those standards to all design and installation work performed under this contract.

b. Examples of work performed

Morcom International Inc. has an extensive track record delivering Public Safety DAS (ERCES) systems, RF engineering services, and large-scale in-building communications infrastructure across a broad range of complex environments. Our project portfolio includes new construction, major renovations, transportation facilities, education campuses, high-rise commercial buildings, and mission-critical operational spaces, each requiring strict adherence to NFPA, IFC, OEM, and AHJ standards.

ARLINGTON COUNTY

Morcom International currently delivers comprehensive, county-wide structured cabling and telecommunications support for Arlington County on a full-time basis. Our dedicated team of two on-site technicians and dedicated project manager provides ongoing installation, maintenance, and troubleshooting services across copper, general telecom, and fiber-optic infrastructure. Equipped with a service vehicle, full toolkits, and stocked material

inventory, our technicians support all IT connectivity requirements, including PCs, network switches, routers, wireless access points, telephone systems (analog and IP), fax lines, and related endpoints.

We manage all new cabling infrastructure, installation, upgrades, and decommissioning, as well as inside-plant and outside-plant fiber projects connecting County buildings, facilities, and parks. Using professional service-desk practices aligned with the ITIL framework, our team processes daily incidents and service requests while coordinating larger capital or infrastructure projects through a structured ticketing workflow.

In addition to technical services, Morcom supplies essential cabling materials, hardware, and connectivity components that support County operations. Our mission is to ensure reliable, efficient, and scalable IT infrastructure across Arlington County’s diverse facilities and departments. This is the culmination of a relationship that spans over a decade, with a more recent and significant project outlined below.

Arlington broadband

In 2020 the COVID-19 epidemic caused major disruption in the way children attend classes. Arlington County Department of Technology Services (DTS) in coordination with Arlington County Public Schools had to provide Broadband wireless coverage to low-income neighborhoods to facilitate public school student’s attendance to on-line classes. Due to its past performance and in-depth knowledge of Arlington’s full capabilities, Morcom was selected through a competitive bid process to assist. From a conceptual point of view the county would use existing infrastructure resources (fiber connectivity, roof-top space, street posts) to install Wi-Fi access points to provide the students with 25/3 Mbps connectivity to the Arlington County Public Schools Distance Learning Portal (Virtual@APS).

Morcom was tasked with conducting a site survey of all listed areas of the town, collecting updated information on the current systems in place, with recommendations on potential options to the County. Following completion of the survey Morcom was further contracted to provide a full design and participate in the deployment of the selected system.



Area to be Covered

Morcom worked quickly to implement a CBRS private network, installing, configuring and activating hundreds of access points, to form a private broadband network, which was available on time for the start of the school term.

Point of Contact Name	Phone Number	E-Mail Address
Matt Adkins	703-228-3224	madkins@arlingtonva.us

D.C. Water Wi-Fi Networks

The DC Water Blue Plains water treatment facility includes over two (2) miles of underground tunnels on a 150-acre campus. Following successful public safety DAS and LMR projects, Morcom was asked to design and install an above ground Wi-Fi network to allow the use of broadband devices across the 150 acre site. Through evaluation of products with the client, Morcom installed a Cisco Meraki solution, with outdoor AP's and a full Cat5a/6 backhaul switching system, linked to their existing infrastructure.

In 2023-2024 Morcom created a conjoined Cisco Meraki Wi-Fi network that covers the 2 miles of tunnels, despite the Radio Frequency (RF) obstacles that include large amounts of steel machinery, 2ft think concrete walls and the sprawling nature of the tunnel system. These Wi-Fi solutions were created completely using the Cisco Meraki system, through a Cat5a POE infrastructure to support IOT and handheld device applications. All three networks have been delivered ahead of schedule, within budget and to the full scope of the original RFP's.

Thanks to creative problem solving and technical design techniques, Morcom was able to reduce the number of Access Points (AP's) by nearly half from DC Waters' original planning, while maintaining full coverage and throughput.



Point of Contact Name	Phone Number	E-Mail Address
Mark Stewart	202- 787-2693	mark.stewart@dcwater.com

Alexander T. Augusta Military Medical Center
(Formerly Fort Belvoir Community Hospital)

The 1,275,000 sq. ft. military hospital features a six-level community hospital, and two clinics, including medical administration areas. In addition to the facility's square footage, the project included two parking garages, surface parking for 3,500 parking spaces, a helipad, ambulance shelter, and a dedicated central utility plant.

Morcom's task was to design and implement an in-building wireless system capable of providing the following services in the hospital:

800MHz and 1,900MHz Cell Service (Verizon and AT&T)

UHF EMS communications

Trunked 800MHz Radio Frequencies

2.4GHz Wi-Fi for a Vocera System

900MHz Paging Re-Broadcast Indoors



One of the most difficult challenges was providing enough indoor antenna density for the hospital's wireless Vocera phone service (35 ft. radius antenna spacing). The limitations imposed by physics in terms of avoiding co-location interference from neighboring antennas and antennas located in identical spots on two different floors.

Morcom used Corning M/A equipment for the head-end and the remote units. The system uses a three-rack headend that houses the Mobile Access conditioner, ancillary modules, and 40 remote cabinets (installed in the telecom closets). Over 490 antennas were required to provide coverage in all areas. In addition, Morcom had to provide a paging re-broadcast throughout the hospital. The Army uses the services of the U.S. Mobility, which sends pages in the 929MHz band. Morcom installed a donor antenna and BDA combination to bring the signal into the head-end and then distributed it throughout the DAS alongside the other services.

Point of Contact Name	Phone Number	E-Mail Address
Mickie Jones	443-775-9186	mickie.jones@dbhds.virginia.gov

US Gov't Bureau of Engraving and Printing

This federal government project called for the installation of armored fiber and coax through 9 floors of the secure facility, to include core drills, fire stops and various conduit requirements, for the connectivity of a Motorola communications system. The team required vetting, a high degree of professionalism and technical expertise, working in conjunction with the Motorola shop, to assist in areas where they did not have the required personnel. Not only were Morcom tasked with the cable installations, but with our trained and certified electrical staff, we also installed 20A power circuits and NEMA installations within 2ft of all equipment locations, as part of the power management plan.

WMATA - Rhode Island and Rosslyn Stations

Through our ongoing close working relationship with WMATA and the contractors that assist in the building, renovation and ongoing support to the DMV's metro system, Morcom has conducted, and has continuing working projects for the installation, testing, modification and maintenance to its public safety, cellular, fiber and electrical systems, within a number of metro stations. Two very similar projects were the installation of fiber and coaxial cabling, to include all conduits and connectivity, within Rhode Island and Rosslyn stations, following redevelopment

efforts. WMATA requires staff to be vetted and trained for security and safety, and work to strict professional and regulatory standards, to include TIA, BICSI, FOA, NFPA and IEC for cable and RF systems.

Morcom also successfully completed a comprehensive range of electrical tasks for these projects, demonstrating expertise in multiple facets of interior electrical work. Morcom technicians expertly installed electrical panels, ensuring efficient power distribution throughout the various facilities, as well as transformer and switchgear installation. Our master electrician and crew designed and installed conduit systems and cable tray pathways, facilitating organized and secure routing of electrical wiring and performed thorough grounding and bonding of electrical systems, ensuring compliance with safety standards and optimal system performance.

c. Design processes, including tools

Morcom's design process starts with the review of the drawings. Whether the building to be served by the DAS is an existing venue or a new construction, typically architectural and electrical drawings will be available. The RF characteristics of the facility must be determined prior to initiation of the detailed DAS design process. Interference sources should be identified, localized to source, and a mitigation plan on how to deal with them should be established.

Our designer then creates a "heat map" of RF coverage throughout the venue so as to indicate relative RF field strength for each frequency band of interest. We identify where all active and passive components will be installed. We provide preliminary design "shop drawings" for new buildings. However, all final radiating device locations are only determined when the infrastructure is in place and an RF survey is completed, that is, until after:

- Structural elements impacting RF absorption, shielding, and reflectivity, such as walls and ceiling, are in place
- Window tint treatments (because of their shielding characteristics) have been completed.

Morcom uses specialist software called iBwave in order to project a propagation analysis and to create a graphical representation. This is very helpful to predict the probable behavior of the signal around the building.

For areas where the predicted signal levels are borderline acceptable we use a spectrum analyzer in order to verify levels and to assist us in planning potential modifications of planned antenna placement.

Another very important element for the design of the DAS is to determine the desired reliability of the system. This is related to how much downtime can be tolerated when a component fails. System redundancy and other features may need to be designed to ensure reliability stays above the tolerable level. The reliability level is often determined by the services provided by the system, the parameters defined by the customer or by the AHJ and NFPA codes.

Building and structural elements must also be taken into account. The following is a list of structural/architectural elements in a building that could have an adverse effect on RF signal propagation:

- Skeleton and decking
 - Steel columns and beams with corrugated steel decking topped with concrete
 - Poured concrete columns, beams, and decking; all containing steel rebar
 - Precast concrete columns, beams, and decking; all containing rebar and/or post tension reinforcing cables
 - Poured concrete shear walls
- Skin

- Metal (e.g., aluminum, steel, etc.)
- Concrete and/or masonry, containing rebar
- Precast concrete wall sections and decking; all containing rebar and/or post tension reinforcing cables – Glass. Some glass and their treatments can adversely affect RF signal propagation. (e.g., low-E glass or low-E glass coatings)
- Plastic
- Mechanical, electrical, plumbing systems (MEP Systems)
 - HVAC ducts, air treatment and air handling equipment, plus control cabling and their conduits
 - Electrical, communication, fire alarm, access control, plus security cabling and their conduits
 - Plumbing piping for fire suppression systems, potable water, sanitary sewer, rainwater drainage, and HVAC chilled water/steam
- Elevators:
 - Structural components and cabs
 - Electrical, fire alarm, and communication pathways, wiring/cabling, and components
 - Cab and shaft ventilation equipment
- Interior walls/partitions:
 - Metal wall studs
 - Fire-rated walls (may have fire-rated doors in them)
 - Lead-lined walls (e.g., in a healthcare facility)
 - Special wall linings in secure communication facilities
- Interior environments:
 - Open environment—An area where no physical obstructions exist between DAS antennas and wireless devices (e.g., conference room, atrium)
 - Partially open environment—An area containing low-severity obstructions (e.g., cubicle partitions) separating DAS antennas from wireless devices in an open office environment
 - Closed environment—An area containing moderate-severity obstructions (e.g., plaster or brick walls) separating DAS antennas from wireless devices
 - Obstructed environment—An area containing high-severity obstructions (e.g., metal reinforced concrete walls, elevator shafts, or large metal surfaces) separating DAS antennas from wireless devices

Indoor antenna placement throughout the building must be done considering all of these structural/architectural elements. Choosing a good location for each indoor antenna is critical to accomplishing the desired coverage levels.

Once the requirement, building structure and technical specifications are understood, a system can be designed that suits the project. This may comprise a highly technical fiber distributed, multi-site network, or a smaller passive DAS. At the time of design, a full network and riser diagram will be developed, a BOM will be created and costed and installation effort and schedule calculated, ready for approval.

d. Commitment to Performing Surveys

Morcom International Inc. fully acknowledges and accepts the requirement to perform regular site surveys during design and throughout construction. Our engineering and field teams are committed to maintaining an accurate understanding of all environmental and physical conditions that could influence system design and performance.

Prior to design finalization, Morcom conducts comprehensive RF and physical site assessments to document existing signal levels, identify nearby DAS or RF systems, and evaluate potential sources of interference. Throughout construction, we perform periodic follow-up surveys, normally yearly in line with NFPA standards, but can be increased based on JMU's requirements, to assess changing conditions such as building enclosures, interior layouts, and power availability evolution. These surveys also verify antenna mounting locations, cable routing paths, equipment room readiness, and grounding integrity.

This proactive approach ensures the final design accurately reflects real-world conditions, minimizes unforeseen issues, and results in a fully optimized, code-compliant Public Safety DAS installation that meets both NFPA 1225 and JMU performance standards.

2. Proposed Solution(s) Overview (Active/Passive)

a. Condition and Supportability of Proposed Solutions

Morcom International Inc. confirms that all PS DAS solutions proposed under this contract, encompassing hardware, software, and firmware, will be provided in new, unused condition and sourced directly through authorized manufacturer channels. All components furnished by Morcom will be fully supported by the respective manufacturer for a minimum of five (5) years from the date of sale, including software revision support, warranty provisioning, available spare parts, and technical assistance. Morcom's long-standing relationships with ADRF and Westell ensure that all deployed equipment is current, serviceable, and compliant with the performance and reliability requirements established by James Madison University.

b. Overall Strategy and Proposed Solution Approach

Morcom's strategy for supporting James Madison University is to provide a flexible, scalable, and AHJ-compliant Public Safety DAS architecture that aligns with both the University's historical deployments and future system expansion needs. Under this contract, Morcom proposes to deploy ADRF and Westell platform solutions, two OEMs that JMU has successfully used across multiple campus buildings—ensuring consistency, ease of integration, and long-term maintainability.

Our approach emphasizes:

- Selection of the most appropriate solution (Active or Passive) based on building conditions, size, structural materials, and RF propagation needs.
- Strict adherence to JMU's design standards outlined in Attachment F, as well as NFPA 1225, IFC 510, and AHJ requirements.
- Providing a fully integrated system that is optimized for robust coverage, DAQ performance, uplink noise mitigation, isolation compliance, and long-term operational reliability.

This strategy ensures that JMU receives high-performance, manufacturer-supported systems that are fully compatible with current and future campus-wide public safety communications requirements.

c. Base Manufacturers and Models Proposed (Active and Passive Options)

Referring to Attachment H it is clear JMU has a majority of ADRF and Westell equipment. While we are experienced and certified for all the major DAS OEM's, it is for this reason Morcom proposes as the primary manufacturers and system models for PS DAS deployments under this contract:

ADRF (Advanced RF Technologies)

- ADRF PSR Series Public Safety Repeaters / BDAs
- ADRF ADXV / ADXPS Passive DAS Components
- ADRF Fiber-Distributed DAS (Active) Options, where applicable

System Type; Active or Passive depending on building conditions and coverage requirements.

Westell Technologies

- Westell PS51000 / PS71000 Public Safety DAS Repeaters
- Westell DAS Interface Units and Passive Components
- Westell In-Building Coverage Enhancement Solutions

System Type: Primarily Passive BDA-based systems, consistent with JMU's existing deployments.

Morcom maintains full authorization and training to deploy, commission, and service both ADRF and Westell platforms, ensuring compatibility with JMU's existing infrastructure and preference for these manufacturers.

d. Peripheral Components Proposed Under This Contract

Morcom International Inc. will provide all required peripheral components necessary for each Public Safety DAS project, tailored specifically to the needs of the building as defined by the iBwave RF design, the construction environment, and the technical requirements outlined in Attachment F, JMU Public Safety DAS Design Specifications. Peripheral hardware will be sourced either directly from the OEM associated with the active equipment platform (e.g., ADRF or Westell) or from industry-standard, manufacturer-approved suppliers to ensure full code compliance, reliability, RF performance and AHJ acceptance.

The following list represents typical peripheral items used in ADRF and Westell-based systems, including example part numbers where applicable:

Passive RF Components

- **Directional Couplers**
 - ADRF: *CPL-698-2700-10* (10 dB directional coupler)
 - Westell: *PSCOUP10-698-2700*
- **Splitters / Tappers**
 - ADRF: *SPT-698-2700-2* (2-way splitter)
 - Westell: *PS-2-698-2700*

- **Terminations**
 - ADRF: *TERM-50-1W*
 - Westell: *PS-TERM50*
- **Attenuators (as required for uplink balancing)**
 - ADRF: *ATT-698-2700-10*
 - Westell: *PSATT10-700/800*

Cabling & Connectivity

- **Coaxial Cable**
 - ½" Plenum or Riser Cable (e.g., Times Microwave LMR-600-PL or OEM-approved equivalent)
- **Connectors & Jumpers**
 - ADRF: *CN-N-M-600* (N-male connectors for ½" cable)
 - Westell: *PSCONN-NM-1/2*

Antennas

- **Indoor Antennas**
 - ADRF: *ANT-O-700/800-DOM* (Omni, PS band)
 - Westell: *PSANT-OMNI-700/800*
- **Donor Antennas**
 - ADRF: *ANT-Y-700/800-10* (10 dB Yagi)
 - Westell: *PS-YAGI-700/800*

Grounding & Lightning Protection

- **Ground Bars, Bonding Kits, and Lugs**
 - ADRF: *GB-KIT-01*
 - Westell: *PSGRNDKIT*
- **Lightning Arrestors**
 - ADRF: *LA-N-F-700/800*
 - Westell: *PSLA-NF-NF*

Battery Backup & Power Components

- **24-Hour Battery Backup Units (NFPA 1225 Compliant)**

- ADRF: *BBU-48V-PS*
- Westell: *PS-BATT-ENCL-48*
- **NEMA Enclosures**
 - ADRF: *ENCL-N4-PS* (Example NEMA 4-rated cabinet)
 - Westell: *PSENCL-N4*

Fiber Transport (if Active DAS elements are deployed)

- **Fiber Jumpers & Trays**
 - Standard OS2 LC/UPC or LC/APC jumpers
- **Remote Unit Accessories (Active Only)**
 - ADRF ADXV/ADXPS compatible expansion modules
 - Westell active interface accessories (building-dependent)

e. OEM letter of certification

Morcom includes, at the end of this document, several OEM letters to include ADRF, Westell as well as Comba, Fiplex from Honeywell, as well as PMR, handset and peripheral suppliers. Our certifications are also included as part of section B.1.b. Should other OEM equipment be required for any future project, Morcom are happy to provide letters of authorization and training.

f. Minimum and maximum area of coverage

The figures below are to be used as rough planning guidelines as coverage area is greatly affected by building layout, use, structure, materials, distance to signal source and other factors.

ADRF Public Safety DAS

Models: PSR Series BDAs, ADXV/ADXPS Fiber/Active DAS

Type: Passive BDA systems or Active headend/remote systems

Minimum Coverage (Smallest Practical Deployment)

- **20,000 – 40,000 sq ft**
A single ADRF PSR-series repeater feeding a small passive DAS (1–5 antennas) can reliably cover this range in low-loss, uncomplicated structures.

Maximum Coverage (Typical Upper Limit)

- **300,000 – 500,000 sq ft** using a Passive ADRF PSR system
- **Up to 1,000,000+ sq ft** using an Active ADXV/ADXPS fiber DAS with multiple remotes

ADRF's active platform scales significantly, limited primarily by donor signal quality, fiber capacity, and AHJ requirements, not by the repeater itself.

Westell Public Safety DAS

Models: PS51000, PS71000, Class A/B BDAs with passive DAS distribution

Minimum Coverage (Smallest Practical Deployment)

- **15,000 – 30,000 sq ft**

A single Westell BDA with 1–3 antennas is common for small buildings, single-story structures, or small public buildings.

Maximum Coverage (Typical Upper Limit)

- **250,000 – 450,000 sq ft** for a Passive Westell BDA-based DAS

Westell solutions are almost always passive, and in large or complex buildings require more careful engineering than active platforms. For very large campuses, a Westell system may be split into multiple BDAs/zones sharing a single donor, however this comes with its own complications, to avoid oscillation, interference and to manage AHJ certification criteria.

g. Average installed cost

Public Safety DAS projects vary significantly in cost due to differences in building construction, floor layouts, materials, required isolation, donor conditions, routing constraints, cable lengths, and the number of antennas necessary to achieve NFPA-compliant coverage. For these reasons, Morcom does not rely on generalized or fixed price-per-square-foot metrics, as these values tend to be inaccurate, misleading, and not technically representative of the true cost of delivering a compliant ERCES system.

Instead, Morcom provides pricing based on site-specific iBwave designs, which properly account for construction materials, RF environment, layout complexity, and the required distribution hardware for each building. Equipment pricing is also influenced by the manufacturer's current price sheets, which may change over time due to supply chain conditions, firmware requirements, or hardware revisions. As such, pricing is best developed using current OEM pricing and a completed design model, rather than theoretical square-foot ranges.

The installed cost of a Public Safety DAS benefits significantly from economies of scale, where larger buildings or multi-floor deployments can be completed more efficiently due to distribution efficiencies, shared pathways, and reduced per-antenna labor. While the total project cost increases with system size, the cost per square foot often decreases as the proportional overhead associated with staging, mobilization, design, commissioning, and testing is distributed across a larger footprint.

Examples of factors contributing to economy-of-scale improvements include:

- Design efficiencies for large or multi-building projects
- Shared vertical risers that reduce cable routing labor
- Larger antenna counts resulting in lower cost-per-unit for installation time

- Consolidated commissioning and acceptance testing
- Reduced mobilization and project management time per ft²
- Ability to reuse headend infrastructure across broader areas (particularly for ADRF Active DAS)

Smaller buildings or those with limited antenna requirements typically exhibit higher per-square-foot cost ranges due to fixed overhead components such as active equipment (BDA's), engineering time, donor antenna installation, grounding system deployment, and mandatory battery backup requirements.

These principles are reflected in the cost-per-square-foot ranges provided in the accompanying table. Final pricing for each JMU project will always be determined based on the iBwave RF design, actual site conditions, and current OEM pricing available at the time of task order issuance.

To meet the intent of this RFP, Morcom will provide average installed cost observations for ADRF and Westell systems based on recent comparable projects. However, we emphasize that these figures are illustrative only and may vary depending on actual project conditions. The most accurate and transparent pricing is presented in Section X, Pricing Schedule, where Morcom has included a full demonstrative quote for the 40,000 sq ft sample building (Attachment G). This model shows the expected equipment quantities, labor requirements, cable lengths, installation efforts, commissioning tasks, and associated pricing necessary to deliver a complete code-compliant PS DAS.

Pricing below is for a standard 700/800 band. JMU may also be providing coverage for the 400Mhz UHF service, which will increase costs.

Proposed Solution / OEM	System Type	Typical Installed Cost per Sq Ft	Notes & Assumptions
ADRF (PSR, ADXV, ADXPS)	Passive or Active	\$0.85–\$1.50 per sq ft	Lower end for simple structures; higher end for multi-floor, complex RF, or active remote architectures. Based on recent mid-size building deployments.
Westell (PS51000 PS71000)	Passive	\$0.50–\$1.25 per sq ft	Most suitable for small- to medium-sized buildings. Actual cost varies by antenna count, coax runs, grounding specs, and donor conditions.
Mixed-OEM or Hybrid Systems	Passive or Active	\$0.75–\$1.75 per sq ft	Used only when required for special construction layouts or system integration needs.

Morcom will provide both MSRP and JMU-discounted pricing for equipment included in the sample project in Section X, based on the most current manufacturer price sheets available at the time of submission. Because OEM pricing fluctuates regularly, all pricing in the proposal reflects the best available published or contracted rates at the time of bid submission. Updated pricing will be provided on a per-project basis during task order issuance.

Installation labor rates and calculation methodologies are also included in Section X. Labor estimates are based on a combination of:

- building size and configuration
- the number of antennas and cable runs required
- the type of system being installed (Active vs. Passive)
- required testing and commissioning procedures
- shipping, staging time, and installation complexity
- safety and compliance tasks (e.g., ladder work, lifts, confined space, battery install, grounding)

Labor is calculated using Morcom’s standard rate structure for technicians, installers, project managers, and commissioning engineers. All labor is billed based on productive on-site time only, in accordance with JMU’s requirements.

This approach ensures JMU receives accurate, defensible, and project-specific pricing rather than generalized square-foot figures that do not reflect actual system needs. The detailed model presented in Section X – Pricing Schedule best demonstrates Morcom’s transparent pricing methodology and provides JMU with a clear understanding of equipment and installation costs for a building of representative size.

For ADRF and Westell solutions, Morcom typically observes higher per-square-foot values in small projects under approximately 50,000 sq ft, with more favorable sq ft pricing emerging in the 50,000–150,000 sq ft range, and the most efficient cost per square foot realized in larger, consolidated deployments above 150,000 sq ft, to around 500,000 sq ft, depending on structural complexity and AHJ requirements. Final pricing for any JMU project will be based on the specific iBwave design, current OEM price sheets, and the actual conditions of the building under consideration.

h. Sample Quote Pricing structure

Morcom International Inc. acknowledges the requirement to provide a sample quote for a Public Safety DAS solution serving all four stories of the representative 40,000 sq ft building referenced in Attachment G, Sample Building Drawing. Using the pricing structure defined in Section X, Morcom has developed a complete illustrative bill of materials, labor profile, installation scope, and commissioning plan that aligns fully with the assumptions provided in the RFP.

The building characteristics, brick exterior, EPDM roof, low-E glazing, steel framing with metal studs, standard gypsum board interior walls, and concrete floor slabs, represent a typical mid-complexity RF environment. The stated donor conditions (RSSI –85 dB on the roof) and interior conditions (RSSI –120 dB throughout the building) indicate that a Public Safety DAS solution using Westell or equivalent equipment is ideal to create an NFPA-compliant signal strength, coverage, reliability, DAQ performance, and uplink noise control across all floors.

Sample Project Assumptions

RF Design Basis:

The proposed solution is based on the representative building drawings provided in Attachment G, assuming a total of 40,000 square feet across four stories with no additional mezzanines or inaccessible areas beyond those illustrated. All modeling and quantity estimates are derived from these sample drawings.

Building Construction Characteristics:

It is assumed that the building construction aligns with the description provided in the RFP: a brick and low-E glass exterior, steel framing with metal studs, standard gypsum board interior walls, and concrete floor slabs. These materials are expected to behave within typical RF attenuation values used during iBwave modeling and indoor propagation analysis.

Donor and Interior RF Conditions:

The design assumes a stable rooftop donor RSSI of –85 dB with reliable line-of-sight to the donor site, and an interior baseline RSSI of –120 dB throughout the structure. These conditions justify the need for a full-coverage DAS and determine the expected system gain, donor antenna selection, filtering, and distribution density.

System Type and OEM Selection:

For this representative building, the system is assumed to be a passive, BDA-based solution using either Westell PS-series equipment. This OEM was selected due to JMU’s existing deployments, established compatibility with campus standards, and alignment with AHJ expectations.

Battery Backup and Power Requirements:

A 24-hour NFPA 1225-compliant battery backup system is assumed, installed adjacent to the BDA headend, with appropriate AC power already available in the proposed telecom or equipment closet. No electrical upgrades or new dedicated circuits are assumed.

Pathways and Cabling:

Standard cable pathways and vertical riser locations, typical for academic buildings, are assumed to be available in the positions implied by the sample drawings. No special routing constraints, hazardous materials, or inaccessible plenum spaces are anticipated, and coaxial cable runs are assumed to follow direct and unobstructed paths.

Grounding and Bonding:

It is assumed that the building grounding electrode system is present, accessible, and suitable for bonding the donor antenna, BDA, surge protection, and battery system in accordance with Attachment F and NFPA 1225 requirements.

Roof Access and Penetrations:

Roof access is assumed to be permissible for installation and alignment of the donor antenna, with structural capacity to support mounting hardware and without the need for reinforcement. A single roof penetration for donor coax is assumed to be feasible without structural modifications.

Permits and Approvals:

The AHJ is known to accept standard ERCES test methods, equipment configurations, antenna types, and documentation formats, but would be checked for any changes prior to installation. JMU is to be involved in the coordination and scheduling of inspections, building access, and any escorts required for construction or commissioning.

Pricing Assumptions:

All pricing is based on Westell and distributor rates available during proposal preparation, including current tariffs, with the understanding that final pricing may adjust after a formal site walk, detailed iBwave design, or if as-built conditions differ from the sample building assumptions.

3. System Installation Methodology and Compliance

Morcom International Inc. acknowledges and fully agrees to all system installation requirements outlined in Section 3 of the RFP.

- a. Morcom accepts full responsibility for all equipment and materials from the time they arrive on site until installation is complete and the system has been formally approved by JMU and the AHJ.
- b. Morcom commits to following all applicable industry standards, manufacturer specifications, and JMU installation best practices throughout the project. In the event of any conflict between standards, Morcom will work collaboratively with JMU to implement the higher or more stringent requirement.
- c. Morcom acknowledges that all required programming, alignment, and service software will be supplied as part of the installation. All software will be current, manufacturer-approved, and the associated licenses will be properly assigned to JMU.
- d. Prior to the start of any on-site work, Morcom will coordinate with the JMU IT Telecom Project Manager to ensure compliance with all site-specific provisions, including required safety training, access control procedures, and any unique operational constraints.
- e. Morcom will maintain clean and orderly work areas and will remove all rubbish, packaging, and installation-related debris from the premises daily, ensuring that JMU facilities remain safe, accessible, and free of unnecessary clutter throughout the project duration.

4. Commissioning Process and Testing Documentation

Morcom International Inc. acknowledges and agrees to all commissioning requirements specified in Section 4 of the RFP.

Morcom commits to performing comprehensive commissioning in accordance with JMU standards, NFPA 1225, IFC 510, manufacturer specifications, and all applicable AHJ requirements. Our commissioning process includes full system validation, hardware verification, uplink and downlink performance testing, spectrum analysis, isolation testing, battery and alarm verification, and any additional tests required to ensure the system meets public safety reliability and intelligibility standards.

Morcom further agrees to utilize JMU- or State-required commissioning forms, including any templates or documentation required by Capital Planning, JMU IT Telecom, the AHJ, or the Virginia State Fire Marshal (VSFM), as well as Morcom's own ISO-9001 quality assurance standards. We will provide complete supporting documentation, including labeled test data, photographs, propagation maps, and configuration logs as part of the final commissioning package.

Morcom will coordinate all commissioning activities with JMU's designated project manager and the appropriate public safety stakeholders to ensure a smooth, compliant, and timely acceptance process.

5. Acceptance and User Testing Procedures (DAQ, RSSI)

Morcom International Inc. acknowledges and agrees to all acceptance requirements outlined in Section 5 of the RFP.

Morcom understands that final acceptance of any Public Safety DAS installation is contingent upon successful user testing and approval by James Madison University, the JMU Police Department, the AHJ, and the VSFM. Morcom will fully support all acceptance and performance testing activities, including grid testing, DAQ verification, RSSI measurement, uplink noise evaluation, and any additional tests required by the AHJ.

Morcom further acknowledges that Public Safety DAS installations must not negatively impact any adjacent or nearby ERCES systems. As part of the acceptance process, Morcom will perform all necessary checks to validate that the new system does not introduce oscillation, interference, or uplink noise to other existing systems operating on the same bands in surrounding buildings or structures. This includes validating donor antenna alignment, ensuring proper uplink isolation, and verifying that system gain levels remain stable and compliant under operational conditions.

Morcom agrees to promptly identify and correct any deficiencies discovered during the acceptance process and will complete all corrective actions prior to formal system acceptance. All punch list items, documentation, and required closeout materials will be completed in a timely and coordinated manner.

6. Documentation and As-Built Deliverables

Morcom International Inc. acknowledges and agrees to all documentation requirements specified in Section 6 of the RFP.

Morcom will provide a complete and accurate documentation package for each project, including but not limited to:

- **Material and equipment lists**, including model numbers, serial numbers, installation locations, tuned frequencies, and warranty details
- **Labeled digital photographs** of all DAS components, including BDAs, donor antennas, remotes, grounding systems, battery enclosures, roof penetrations, and cable routing
- **As-built drawings** in both PDF and native format (iBwave), including antenna locations, cable pathways, and headend configuration
- **Floor plans with and without grid overlays**, delivered in both electronic and hard-copy format at least 48 hours prior to scheduled inspections
- **Spectrum analyzer reports**, signal strength propagation maps, and heat maps showing both design expectations and as-built conditions
- **Final system configuration files**, programming data, and commissioning reports

Morcom understands that complete, accurate documentation is essential for JMU's operations, maintenance planning, and future expansion, and we commit to delivering all required documents in the formats and timelines specified.

7. Warranty Terms (Base + Extended)

Morcom International Inc. acknowledges and agrees to all warranty requirements outlined in Section 7 of the RFP.

Morcom guarantees that all equipment, software, and installation labor provided under this contract will be free from defects and fully warranted for one (1) year from the date of final system acceptance. This includes all contractor-furnished hardware, software, firmware, and labor.

Morcom also agrees to provide optional extended equipment and software warranty pricing for years 2 through 5, as well as a prepaid five-year extended warranty option, as required in Section X of the Pricing Schedule. All extended warranty services will be performed in accordance with the manufacturers' requirements and will include timely replacement of defective components, firmware updates, and technical support.

During all warranty periods, Morcom will perform any necessary preventive maintenance on contractor-installed hardware and software, ensuring ongoing compliance with JMU's operational standards and AHJ performance requirements.

8. Maintenance and Service Plan

Morcom International Inc. acknowledges and fully agrees to all maintenance requirements outlined in Section 8 of the RFP. Morcom is prepared to provide comprehensive maintenance, monitoring, troubleshooting, and performance verification services for both newly installed Public Safety DAS systems and for existing systems listed in Attachment H – JMU DAS Inventory.

Morcom's maintenance program ensures that each system remains compliant with NFPA 1221 and 1225, IFC 510, JMU standards, manufacturer specifications, and AHJ requirements throughout its operational life or while Morcom is under contract.

Morcom confirms its ability to maintain, repair, and optimize public safety DAS systems currently deployed across the JMU campus, including systems manufactured by ADRF, Westell, and other platforms identified in Attachment H.

Our technicians and engineers are trained and certified on the equipment typically used by JMU, ensuring full compatibility and immediate service readiness.

a. Maintenance Options and Scope

Morcom will provide maintenance service options structured to meet JMU's operational needs. These may include:

- **Full-service maintenance** (labor + materials)
- **Labor-only maintenance** with parts billed separately
- **Preventive maintenance programs** based on annual or semi-annual visits
- **Time & Material (T&M) service** for non-covered tasks or will-call requests

Any maintenance option can be expanded to include additional buildings or systems as new DAS installations are completed under this contract. Pricing for all available options is provided in Section X – Pricing Schedule and a detailed description of our maintenance plan is contained in an example of our maintenance contract, which is included in section VII.

b. Maintenance Task Schedule

Morcom will perform all preventive and corrective maintenance tasks identified in the RFP, including but not limited to:

1. Review of degraded service alarms or performance anomalies
2. Evaluation of nuisance failures or intermittent system impairments
3. Inspection of donor antennas and rooftop equipment
4. Verification of grounding and bonding integrity
5. Review of BDA gain settings, filters, and noise levels
6. Check of all passive components including connectors, cables, and terminations
7. Battery and power system testing, including 24-hour battery backup compliance
8. Signal level verification throughout the building
9. Comparison of current performance to original acceptance test levels
10. Verification of amplifier linearity and noise rise
11. Inspection of NEMA enclosures and environmental conditions
12. RF noise-floor assessment and oscillation checks
13. Updates to system documentation, labeling, and as-built accuracy

All maintenance work will be recorded in detailed service reports delivered to JMU following each visit.

c. OEM Letters for Warranty and Maintenance Authorization

Morcom will provide manufacturer letters from ADRF, Westell, and in the future, any additional proposed OEMs affirming that Morcom is authorized and qualified to perform warranty service, maintenance, and repair on the systems included in Attachment H, as well as those installed under this RFP. These letters will be included in the appendix of the proposal at section VII.

d. Service Level Agreement (SLA)

Morcom proposes the following Service Level Agreement for emergency support to JMU:

Definition of an Emergency

For the purposes of this response, an emergency includes, but is not limited to:

- Complete loss of public safety radio coverage within a building or critical area;
- Significant degradation of coverage in critical areas (e.g., fire command center, exit stairways, elevator lobbies, fire pump rooms, emergency operations areas);
- Failure of the BDA or headend equipment resulting in loss of service;
- Alarms from JMU or the AHJ indicating oscillation, harmful interference, or unacceptable uplink noise affecting the public safety radio system;
- Battery, power, or system failure that jeopardizes code compliance or life safety.

Response and Restoration Targets

Emergency Response:

- Remote response / triage within 2 hours of notification.
- On-site dispatch typically within 4–8 business hours (or as otherwise agreed with JMU for after-hours emergencies).

Non-Emergency / Routine Service:

- Scheduled within 3–5 business days, subject to JMU operational constraints.

Escalation Procedures**Level 1 – Field Technician / NOC**

- Initial troubleshooting, remote diagnostics, and immediate mitigation steps where possible.

Level 2 – Project / Service Manager

- Coordination with JMU IT Telecom, prioritization of emergency work, resource allocation, and communication of status and action plan.

Level 3 – Director / Senior Technical Lead

- Engagement for complex or recurring issues, AHJ coordination support, and system-level remediation planning.

Morcom will provide JMU with dedicated 24/7 contact details for emergency support at contract kickoff, including:

- Primary emergency phone number
- Secondary escalation contact number
- Named primary and backup service contacts (with titles and email addresses)

These contact details will be maintained current and updated promptly if personnel change.

e. Technician Certifications and Training

Morcom will ensure that all personnel performing maintenance remain current on:

- OEM training and certification (ADRF, Westell, etc.)
- RF safety and DAS-specific training
- OSHA and confined space compliance
- Code updates under NFPA 1225 and IFC 510

Technicians will continue to receive updated training as industry standards evolve and as JMU adds new DAS systems under this contract.

f. Service Centers, Parts Availability, and Restoration Strategy

Morcom's nearest technical operations and dispatch center is located at:

Morcom International Inc.

44427 Atwater Drive
Ashburn, VA 20147

This location serves as our primary base for RF-qualified technicians, commissioning personnel, and installation teams. While Morcom does not maintain a standing warehouse of spare ERCES components, we maintain rapid procurement capability through regional distributors and OEM partners, enabling expedited access to replacement parts when needed. We also have engineering manpower in Richmond VA and across the DMV.

Morcom does not hold a fixed inventory of public safety DAS components; however, we maintain established procurement relationships with ADRF, Westell, and major national distributors such as Tescos, Graybar, Anixter, Accu-Tech and OEM-direct channels.

Through these partners, Morcom can rapidly access and source:

- BDAs, amplifier modules, and PSU components
- Passive DAS components (couplers, splitters, terminations, antennas, connectors, lightning protection, grounding hardware)
- Donor antennas, mounting hardware, and coax jumpers
- Battery backup units and associated wiring components

This approach ensures that JMU has reliable access to current-generation, manufacturer-supported components without relying on stored inventory that may become obsolete.

Because JMU operates many existing ERCES systems of varying age, manufacturer, and configuration, Morcom cannot responsibly recommend specific on-campus or warehouse spare parts until a full system audit is conducted and an understanding of currently held spares is known.

A comprehensive audit is required to determine:

- Exact models of existing BDAs
- Band configurations and filter types
- Age and revision levels of deployed hardware
- Passive component types and values
- Donor antenna configurations
- Common failure points or aging components
- Battery backup system types and age
- Existing Spares

After this audit, Morcom will provide a data-driven Spare Parts Recommendation Report tailored to:

- JMU's actual hardware mix
- The age and health of each system
- The likelihood of parts failure
- Criticality of the building or use case
- Budget and operational constraints

This ensures that any recommended spares are accurate, cost-effective, and relevant.

If a required part is not available from JMU or immediately sourced through Morcom's procurement channels, Morcom will:

1. Expedite procurement through OEM-direct or authorized distributors, including overnight or same-day delivery where available.
2. Coordinate closely with JMU and AHJ if critical components—such as BDAs, donor antennas, or power systems—require post-replacement verification or retesting.
3. Maintain continuous communication with JMU IT Telecom regarding timelines, delivery status, and service restoration estimates.

This approach ensures that even without pre-staged inventory, Morcom can restore service quickly, transparently, and in compliance with all public safety requirements.

h. Lightning damage policy

Morcom follows industry-standard practices for addressing lightning-damaged ERCES equipment. When lightning damage is suspected or confirmed, Morcom will dispatch qualified technicians to assess the affected components, verify grounding and surge-protection integrity, and document the failure for warranty or insurance purposes. Most OEMs do not cover lightning strikes under standard warranty; however, Morcom can assist JMU in pursuing replacement through manufacturer repair programs and the documentation, assessments and reports needed for insurance claims and can provide expedited procurement and installation of replacement parts. Optional extended warranty or enhanced maintenance plans may also be structured to include priority replacement and reduced-cost repair of lightning-affected equipment if desired by JMU. We may also be able to offer unique and intelligent engineering solutions on how to maintain DAS coverage during repair processes, from alternative signal sources, fiber remotes from other networks or short term BDA installation.

A key element to any lightning protection policy is to identify the failings of the protection system that was in place at the time of the strike, creating clear understanding of the equipment, faults or design issues that may have been a factor in lightning damage. This information should be used not only on the affected network, but any potential sites that share common equipment, designs or risk.

i. Annual performance testing

Annual performance testing is conducted in accordance with NFPA 1225, NFPA 1225, IFC 510, manufacturer requirements, and JMU's acceptance standards. Testing can include full signal-level verification, grid-based DAQ assessments in critical and general areas, uplink noise measurements, donor path analysis, amplifier performance checks, battery testing, grounding inspection, and comparison against original commissioning benchmarks. Morcom utilizes professional-grade equipment such as the PCTEL SeeHawk platform, Anritsu spectrum analyzers, Fluke multimeters and other calibrated tools to ensure accurate and repeatable measurements. All test results are documented with time-stamped readings, annotated floor plans, and photographs of test locations. Deliverables can be provided in Microsoft Word, PDF, or Microsoft Excel formats, including raw measurement files when applicable. Morcom ensures all documentation is structured for ease of review by JMU, the AHJ, and public safety agencies.

j. Training Provision

Morcom can offer comprehensive training for JMU personnel covering Public Safety DAS system operation, alarm interpretation, basic troubleshooting, maintenance expectations, and procedures for initiating service requests.

Training sessions can be delivered on-site at JMU, virtually, or at Morcom's Ashburn Technical Operations Center, depending on JMU's preference. Content is tailored for technical staff, public safety personnel, or facilities teams and includes system overviews, component identification, monitoring practices, and recommended response actions for common system events. All training can be delivered in instructor-led classroom format, hands-on walkthroughs of installed systems, or live interactive webinars. Associated training costs, including optional refresher sessions or expanded technical modules, are detailed in Section X – Pricing Schedule.

k. Time and Material (Will Call) pricing

Complete Time and Material (T&M / Will-Call) pricing can be found in Section X for any services not covered under warranty or an elected maintenance plan. This schedule will include all labor categories, hourly rates, minimum service charges, travel costs, equipment or lift fees (if applicable), material markups, and any other expenses the University may reasonably expect to incur when requesting unscheduled service. Morcom's T&M structure is transparent, straightforward, and designed to ensure JMU can accurately forecast the cost of non-covered repairs or supplemental work.

C. Other Services

Morcom International Inc. is authorized and fully qualified to provide JMU with a broad range of complementary communications, RF engineering, and low-voltage technology services that support campus operations and future infrastructure projects. In addition to Public Safety DAS, Morcom provides in-house cellular DAS design and installation, RF engineering and modeling, fiber-optic installation and splicing, network cabling, Wi-Fi engineering, microwave and point-to-point wireless links, backhaul solutions, technology project management, and FCC-compliant RF testing and certification services. These services are performed by Morcom's internal engineering, installation, and commissioning teams, supported by master electricians, certified fiber technicians, and experienced RF engineers.

Morcom is also authorized to supply and integrate technology from a wide portfolio of manufacturers, including cellular DAS systems from JMA, SOLiD, ADRF and CommScope, public safety systems from ADRF, Fiplex, and Westell, Wi-Fi and network solutions from Ruckus, Cambium, and Cisco and a host of RF and telecommunications products and services, including P25 and other LMR radio handsets and network devices from Icom, BK Radio, WinRadio, Harris and many more.

Manufacturer letters of authorization for Morcom's supported OEMs, including ADRF, Westell, and other relevant platform providers, will be included in the appendix of this proposal. Detailed pricing for all optional systems, integration labor, and related services will be provided in Section X – Pricing Schedule, allowing JMU to leverage Morcom as a single, qualified vendor for a wide range of current and future communications-infrastructure needs.

V. PROPOSAL ATTACHMENTS

Attachment A – Offeror Data Sheet

Please see Attachment A – Offeror Data Sheet, completed in full at the end of this document.

Attachment B – SWaM Utilization Plan

Morcom international will not be using sub-contractors for the fulfillment of this contract, however if the need arises in the future, Morcom will follow the stipulations as laid out in attachment B and its reference documents.

B.6 Sales to VASCUPP Members

Morcom International Inc. confirms that we have not conducted sales with any VASCUPP Member Institutions during the past twelve months. While we have not previously contracted with these institutions, Morcom has extensive experience delivering large-scale public safety DAS, cellular DAS, RF engineering, and telecommunications infrastructure projects for higher education, government, transportation, and critical facilities throughout the region. We welcome the opportunity to establish a strong and reliable partnership with James Madison University and the broader VASCUPP community.

VI. PRICING SCHEDULE (SECTION X)

Sample 40,000 ft² Building Quote (Attachment G)

The costs below are for an NFPA and AHJ compliant solution for both 700/800mHz and 400mHz systems, which may be required. This price will be reduced significantly if only 1 band is required and will be based on exact location and AHJ requirements.

Sample Building Price

Total ROM List Price:	\$	50,170.68
Total Engineering and installation	\$	15,288.33
Total Solution Price	\$	65,459.01

BOM and equipment pricing totals:

Total ROM Price:	\$	50,170.68
Total Westell Price:	\$	43,829.60
Total Non-Westell Price:	\$	6,341.08

BOM and equipment pricing

Quantity	SKU	DESCRIPTION	LIST PRICE	EXTENDED	JMU EXTENDED PRICE
Public Safety BDA/Repeaters					
1	CS45-727-827-K2	ProtectLink class A/B 700/800MHz BDA with 32 digital filters per band, 90dB DL gain, 27dBm power output. Class A,B or A/B (no FiberDAS Connection BBU-004 and 1 xCS19-BAT100AH31 100 AH battery included)	\$ 12,062.45	\$ 12,062.45	\$ 12,665.57
1	CS40-U34-U2D-A0	UHF 450-512 MHz, 2.5 Watt, 3.5 MHz PB/1.5 MHz GB	\$ 24,172.51	\$ 24,172.51	\$ 25,381.13
2	CS40-ANNUNC	Compact annunciator panel for ProtectLink Series BDAs.	\$ 825.00	\$ 1,650.00	\$ 1,732.50
1	CS19-BBC-003	12/24 Hour NFPA Compliant BBU for PS Enhanced Series BDAs, Order batteries separately	\$ 1,422.11	\$ 1,422.11	\$ 1,493.21
2	CS19-PYL12V160FT	12V, 160AH Sealed AGM Lead Acid Battery	\$ 923.12	\$ 1,846.24	\$ 1,938.55
Antennas					
1	CS03-003-430	700/800MHz Yagi Antenna, 11 dBi	\$ 239.17	\$ 239.17	\$ 251.13
1	CS03-025-840	UHF Yagi donor antenna, 11dBi gain	\$ 352.46	\$ 352.46	\$ 370.09
8	CS03-043-380	Wideband UHF-960MHz Ceiling mount omni antenna	\$ 100.97	\$ 807.73	\$ 848.12
Splitters, Couplers, Tappers (Passives)					
1	CV04-500-629	2-Way 50W Power Splitter, 138-960MHz, N connectors [Red Wilkinson Splitter]	\$ 188.00	\$ 188.00	\$ 197.40
6	CS05-4xx-114	Power Tapper, 200W, N connectors (340-2700 MHz), Various values	\$ 64.00	\$ 384.00	\$ 403.20
1	CS06-770-846	VHF-UHF / 700-800 Cross Band Coupler	\$ 622.06	\$ 622.06	\$ 653.16
Coaxial Cable					
160	Outdoor Coax	Outdoor rated 1/2" coaxial cable	\$ 2.70	\$ 432.00	\$ 453.60
800	Indoor Coax	Plenum rated indoor 1/2" coaxial cable	\$ 2.90	\$ 2,320.00	\$ 2,436.00
24	Connector	N type coaxial connector for 1/2" coaxial cable	\$ 25.00	\$ 600.00	\$ 630.00
8	Jumper	Plenum rated indoor flexible coaxial cable with N type connectors	\$ 50.00	\$ 400.00	\$ 420.00
2	CS60-024-002	Lightning protector for donor coaxial cable Female to Female	\$ 41.44	\$ 82.87	\$ 87.01
2	Ground	Insulated Ground Panel	\$ 100.00	\$ 200.00	\$ 210.00
				Total	\$ 50,170.68

JMU will not pay more than 5% above list price. Other OEM's may provide more competitive pricing and each project will be calculated to provide the best technical and financially attractive option.

Engineering and labor, including warranty

DESIGN & ENGINEERING (Services)	Service Price
Prepare Submittals (Review Specs, Site Survey, Initial/Final Submittals, Meetings, Documents)	\$ 1,750.00
RF Design (iBwave, CADs, Copies)	\$ 1,750.00
System Setup and Optimization	\$ 750.00
System Testing	\$ 750.00
Project Management/Supervision over the course of the project	\$ 1,750.00
Permits	\$ -
SUB-TOTAL (DESIGN & ENGINEERING)	\$ 6,750.00
Installation & Maintenance (Services)	
Installation Costs	\$ 6,038.33
Preventative and "On Call" Maintenance Services	
One year warranty MATERIAL	\$ 1,750.00
SUB-TOTAL (INSTALLATION & MAINTENANCE)	\$ 7,538.33
Shipping	\$ 1,000.00
Design & Engineering total	\$ 15,288.33

Maintenance Pricing and Options

Description	Unit of Measure	Quantity	Unit Price	Total Price
Perform Annual Maintenance of Existing Systems Year 1	Per Year	1	14,930.00	14,930.00
Perform Annual Maintenance of Existing Systems Year 2	Per Year	1	15,676.50	15,676.50
Perform Annual Maintenance of Existing Systems Year 3	Per Year	1	16,460.33	16,460.33
Perform Annual Maintenance of Existing Systems Year 4	Per Year	1	17,283.34	17,283.34
Perform Annual Maintenance of Existing Systems Year 5	Per Year	1	18,147.51	18,147.51
Perform Annual Performance Testing and Benchmarking of existing systems (as indicated in RFP Attachment F)	Per Year	1	14,870.00	14,870.00
24/7 Toll-Free Phone Support (per year)	24/7	1	N/C	Included
Non-Scheduled Site Visits (Emergency or per Call)	Per Occurrence		650.00	Optional
Optional remote Monitoring Service for Existing DAS Systems	Yearly for All		19,000.00	Optional
Optional Training (per 2-hour session)	Per Occurrence		1,750.00	Optional
THESE PRICES HAVE NOT CHANGED SINCE OUR SUBMISSION IN AUGUST 2020				

Will-Call Time and Material Rates

Category/Item	Standard Rate
Labor:	
Program Manager	\$145.00
Quality Control Manager	\$125.00
Cabling Manager	\$114.47
Administrative	\$80.00
Engineering	\$125.00
PIM Testing Rate (per test)	\$50.00
Cabling Technician-Fiber	\$107.00
Cabling Technician-Coax/other	\$107.00
Equipment Installer	\$107.00
Journeyman	\$107.00

VII. ATTACHMENTS AND SUPPORTING DOCUMENTS

Attachments

Please see attached the following documentation:

1. RFP Cover page
2. Attachment A – Data Sheet
3. Attachment B - SWAM
4. Manufacturer Letters of Authorization
5. Technician Certifications and Safety Credentials
6. Proof of Insurance and Licensing
7. Commissioning Report Template
8. Key Staff Resumes

REQUEST FOR PROPOSAL

RFP# KBF-1239

Issue Date: October 30, 2025

Title: Public Safety Distributed Antenna System (DAS)

Issuing Agency: Commonwealth of Virginia
James Madison University
Procurement Services MSC 5720
752 Ott Street, Wine Price Building
First Floor, Suite 1023
Harrisonburg, VA 22807

Period of Contract: From Date of Award Through One Year (Renewable)

Sealed Proposals Will Be Received Until 2:00 PM on December 10, 2025 for Furnishing the Services Described Herein. (See Special Terms & Conditions "D. Late Proposals")

SEALED PROPOSALS MAY BE MAILED, EXPRESS MAILED, SUBMITTED IN eVA, OR HAND DELIVERED DIRECTLY TO THE ISSUING AGENCY SHOWN ABOVE.

All Inquiries for Information and Clarification Should Be Directed To: Katie Forsyth, Buyer Senior, Procurement Services, forsytkb@jmu.edu; 540-568-5113; (Fax) 540-568-7935 not later than five business days before the proposal closing date.

NOTE: THE SIGNED PROPOSAL AND ALL ATTACHMENTS SHALL BE RETURNED.

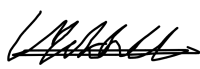
In compliance with this Request for Proposal and to all the conditions imposed herein, the undersigned offers and agrees to furnish the goods/services in accordance with the attached signed proposal or as mutually agreed upon by subsequent negotiation.

Name and Address of Firm:

Morcom International Inc.

44427 Atwater Drive, suite 140,

Ashburn, VA 20147

By: 
(Signature)

Name: Luke Mitchell
(Please Print)

Date: December 7th, 2025

Title: Director, Technical Programs

Web Address: www.morcom.com

Phone: 703 220 7013

Email: lmitchell@morcom.net

Fax #: _____

ACKNOWLEDGE RECEIPT OF ADDENDUM: #1 _____ #2 _____ #3 _____ #4 _____ #5 _____ (please initial)

SMALL, WOMAN OR MINORITY OWNED BUSINESS:

☒ YES; ☐ NO; *IF YES* ⇒ ☒ SMALL; ☐ WOMAN; ☐ MINORITY *IF MINORITY:* ☐ AA; ☐ HA; ☐ AsA; ☐ NW; ☐ Micro

Note: This public body does not discriminate against faith-based organizations in accordance with the Code of Virginia, § 2.2-4343.1 or against an offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

ATTACHMENT A

OFFEROR DATA SHEET

TO BE COMPLETED BY OFFEROR

1. **QUALIFICATIONS OF OFFEROR:** Offerors must have the capability and capacity in all respects to fully satisfy the contractual requirements.
2. **YEARS IN BUSINESS:** Indicate the length of time you have been in business providing these types of goods and services.

Years 41 Months 6

3. **REFERENCES:** Indicate below a listing of at least five (5) organizations, either commercial or governmental/educational, that your agency is servicing. Include the name and address of the person the purchasing agency has your permission to contact.

CLIENT	LENGTH OF SERVICE	ADDRESS	CONTACT PERSON/PHONE #
--------	-------------------	---------	---------------------------

OUC, DC	4 years	2720 Martin Luther King Jr. Ave SE, Washington DC 20032	Mr Jayson Carry (202) 538-2568
---------	---------	---	----------------------------------

DC Water	2 years	5000 Overlook Ave, SW, Washington DC 20032	Mr Mark Stewart (202) 787-2693
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Arlington County	1 year	2100 Clarendon Bvd, Suite 500 Arlington	Mr ##### VA 22201 (703) 228-3410
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4. List full names and addresses of Offeror and any branch offices which may be responsible for administering the contract.

Morcom International Inc. 44427 Atwater Drive, Suite 140, Ashburn VA. 20147

5. **RELATIONSHIP WITH THE COMMONWEALTH OF VIRGINIA:** Is any member of the firm an employee of the Commonwealth of Virginia who has a personal interest in this contract pursuant to the [CODE OF VIRGINIA](#), SECTION 2.2-3100 – 3131?

[] YES [X] NO

IF YES, EXPLAIN:

ATTACHMENT B

Small, Women and Minority-owned Businesses (SWaM) Utilization Plan

Offeror Name: Morcom International Inc.

Preparer Name: Mr Luke Mitchell

Date: 12/7/2025

Is your firm a **Small Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes ☒ No ☐

If yes, certification number: 5054 Certification date: Valid through July 12, 2028

Is your firm a **Woman-owned Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes ☐ No ☒

If yes, certification number: Certification date:

Is your firm a **Minority-Owned Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes ☐ No ☒

If yes, certification number: Certification date:

Is your firm a **Micro Business** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes ☐ No ☒

If yes, certification number: Certification date:

Instructions: *Populate the table below to show your firm's plans for utilization of small, women-owned and minority-owned business enterprises in the performance of the contract. Describe plans to utilize SWaMs businesses as part of joint ventures, partnerships, subcontractors, suppliers, etc.*

Small Business: "Small business " means a business, independently owned or operated by one or more persons who are citizens of the United States or non-citizens who are in full compliance with United States immigration law, which, together with affiliates, has 250 or fewer employees, or average annual gross receipts of \$10 million or less averaged over the previous three years.

Woman-Owned Business Enterprise: A business concern which is at least 51 percent owned by one or more women who are U.S. citizens or legal resident aliens, or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in which is owned by one or more women, and whose management and daily business operations are controlled by one or more of such individuals. **For purposes of the SWAM Program, all certified women-owned businesses are also a small business enterprise.**

Minority-Owned Business Enterprise: A business concern which is at least 51 percent owned by one or more minorities or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in which is owned by one or more minorities and whose management and daily business operations are controlled by one or more of such individuals. **For purposes of the SWAM Program, all certified minority-owned businesses are also a small business enterprise.**

Micro Business is a certified Small Business under the SWaM Program and has no more than twenty-five (25) employees **AND** no more than \$3 million in average annual revenue over the three-year period prior to their certification.

All small, women, and minority owned businesses must be certified by the Commonwealth of Virginia Department of Small Business and Supplier Diversity (SBSD) to be counted in the SWAM program. Certification applications are available through SBSD at 800-223-0671 in Virginia, 804-786-6585 outside Virginia, or online at <http://www.sbsd.virginia.gov/> (Customer Service).

RETURN OF THIS PAGE IS REQUIRED

ATTACHMENT B (CNT'D)
Small, Women and Minority-owned Businesses (SWaM) Utilization Plan

Procurement Name and Number: RFP_KBF-1239_JMU_DAS

Date Form Completed: 11/10/2025

Listing of Sub-Contractors, to include, Small, Woman Owned and Minority Owned Businesses
for this Proposal and Subsequent Contract

Offeror / Proposer:

Morcom International Inc.
Firm

44427 Atwater Drive, suite 140, Ashburn, VA 20147
Address

Luke Mitchell, (703) 220 7013
Contact Person/No.

Sub-Contractor's Name and Address	Contact Person & Phone Number	SBSD Certification Number	Services or Materials Provided	Total Subcontractor Contract Amount (to include change orders)	Total Dollars Paid Subcontractor to date (to be submitted with request for payment from JMU)
No Subcontractors in use					

(Form shall be submitted with proposal and if awarded, a SWaM Sub-contractor Reporting Form shall be submitted to swamreporting@jmu.edu)

RETURN OF THIS PAGE IS REQUIRED



April 15, 2025

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized reseller/distributor of Westell products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by Westell to customers in states of Maryland and Virginia and the District of Columbia.

Sincerely, *George Pitsoulakis*

Name: George Pitsoulakis

Title: Director, In Building Wireless Product Management

Phone: 630-375-4266

Email: gpitsoulakis@westell.com



THE SIGNAL FOR SUCCESS™

ADVANCED RF TECHNOLOGIES, INC.

Tel +1 818.840.8131 Fax +1 818.840.8138

Technical/Customer Support +1 800.313.9345

3116 West Vanowen Street Burbank, CA 91505

Web www.adrftech.com

March 27, 2025

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized reseller/distributor of Advanced RF Technologies, Inc. ("ADRF") Active & Passive products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by ADRF to customers in the states of Maryland, Virginia, and the District of Columbia.

Sincerely,

John Shubin

Director of Sales

Advanced RF Technologies, Inc. (ADRF)

3116 W. Vanowen St., Burbank, CA

Direct: (949) 363-3526

Office: (818) 840-8131

Email: jshubin@adrftech.com



March 27, 2025

TO WHOM IT MAY CONERN:

BK Technologies certifies that Morcom International, Inc. is a UNIQUE AUTHORIZED BK Sales Agent for our P25 portable, mobile and fixed station radios and positioning systems authorized to sell in Virginia, Maryland and The District of Columbia.

At time of this letter Morcom International, Inc. is in good financial standing with BK Technologies.

The company Morcom International, Inc. has the technical and commercial support of BK Technologies for the provision of:

1. Portable radios of the multi-band BKR9000, single-band BKR5000 family and their accessories.
2. KNG-M Vehicular Radios of the VHF, UHF, and 700/800 MHz bands and their accessories.
3. KNG-B fixed stations for the VHF, UHF, and 700/800 MHz bands and their accessories.
4. BK ONE Solutions portfolio such as InteropONE, LocateONE and RelayONE and their accessories.

Please let me know if I can assist further.

Sincerely,

Lee Canipe

A handwritten signature in black ink that reads "Lee Canipe". The signature is written in a cursive, flowing style.

Regional Sales Manager – East

BK Technologies

Mobile: 864-733-1400 | E-mail : lcanipe@bktechnologies.com



First in Communications

April 14th, 2024

RE: Verification of Icom Dealer Status

This letter is to confirm that Morcom International, Inc. is currently an authorized Land Mobile Dealer in good standing, subject to the terms and conditions of the Icom Dealer agreement between Morcom International, Inc. and Icom America, Inc.

Morcom International, Inc. is authorized to sell Icom products listed in Icom's Land Mobile Retail Price Book.

Sincerely,

ICOM AMERICA INC.

A handwritten signature in black ink, appearing to read "Jon Paul Beauchamp", with a stylized flourish at the end.

Jon Paul Beauchamp, KB³SBD
Senior Manager / Business Development



April 14, 2025

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized distributor of L3 Harris Inc. products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by L3 Harris Inc to customers in the states of Maryland and Virginia and the District of Columbia.

Sincerely,

Wallace Mitchell

Channel Manager, Northeast Indirect Channel

Communication Systems / L3HARRIS Technologies

Mobile: 434-241-4665

ACTION-URGENCY-EXCELLENCE



March 27, 2025

From :Comba Telecom

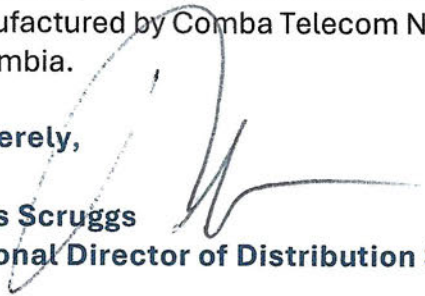
Re; Morcom International

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized reseller/distributor of Comba Telecom NA products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by Comba Telecom NA to customers in states of Maryland and Virginia and the District of Columbia.

Sincerely,


Chris Scruggs
National Director of Distribution Sales

410-207-8360

cscruggs@combausa.com



Honeywell International Inc.
715 Peachtree St NE
Atlanta, GA 30308

March 31, 2025

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized reseller/distributor of Fiplex by Honeywell products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by Fiplex by Honeywell to customers in states of Maryland and Virginia and the District of Columbia. This letter is valid for 1 year through March 31st, 2026. If renewal is required, please contact Pablo Martincorena.

Sincerely,

.

Name: Pablo Martincorena
Title: NE Territory Manager

Phone: 305.606.530
Email: pablo.martincorena@honeywell.com



16550 West Bernardo Drive, Suite 550, San Diego, CA 92127, USA

Tel: +1 858.485.9442 • Fax: +1 858.485.9445

April 11, 2025

To Whom It May Concern:

This letter verifies that Morcom International, Inc. is a representative and an authorized reseller/distributor of __Nextivity Inc. ____ products.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by _Nextivity Inc.____ to customers in states of Maryland and Virginia and the District of Columbia.

Sincerely,

Name: Dallas Defibaugh

Title: Regional Sales Director-East

Phone: 610.427.3255

Email: ddefibaugh@nextivityinc.com





INNOVATIVE COMMUNICATION SOLUTIONS

April 15, 2025

Luke Mitchell

Morcom International, Inc.
44427 Atwater Dr.
Suite 140
Ashburn, VA 20147

RE: State of Maryland Contract Bid

To Whom it may concern:

This letter verifies that Morcom International, Inc., with principal offices at 44427 Atwater Dr, Suite 140, Ashburn, VA 20147, is a representative and an authorized Dealer/Reseller/Service Organization of G-Way Solutions, LLC, the Original Equipment Manufacturer (OEM) of G-Wave and American Built DAS products and services.

Additionally, it confirms that Morcom International, Inc. is authorized to sell products and services manufactured by G-Way Solutions, LLC to customers in states of Maryland and Virginia and the District of Columbia.

This letter will also certify that all G-Wave products are Build America, Buy America compliant.

Sincerely,

*Dennis J. Burns
Vice President
DAS Division
G-Way Solutions*

We are AMERICAN BUILT!

17-01 Pollitt Drive I Fair Lawn, NJ 07410

Direct: (201) 755-9500

Email: D_Burns@GWaveRF.com



Date: 3/28/2025

Dear Sir or Madam:

Tessco LLC (Tessco) provides this letter of authorization on behalf of Morcom International, Inc. ("Reseller"). Tessco certifies that Reseller is an authorized customer of Tessco and a reseller of original equipment manufacturers (OEMs) products, as distributed by Tessco.

Tessco's contractual relationship with each of the OEMs authorizes Tessco to distribute OEM products to customers like Reseller that are authorized under this arrangement to resell the product to end customers, subject to OEM guidelines.

If you have any questions or concerns, please contact Tessco's internal point of contact for Reseller:

Name: Brad Sikorski

Email: sikorskib@tessco.com

Thank you for your time and attention to this matter. We hope that this letter provides the requisite information to meet your guidelines.

Sincerely,

11126 McCormick Road | Hunt Valley, Maryland
21031-1494 USA

TEL 410 229 1000 | FAX 410 527 0005 | www.tessco.com

COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation

9960 Mayland Drive, Suite 400, Richmond, VA 23233

Telephone: (804) 367-8500

EXPIRES ON

02-28-2026

NUMBER

2705120123

BOARD FOR CONTRACTORS
CLASS A CONTRACTOR
CLASSIFICATIONS CIC ESC



MORCOM INTERNATIONAL INC
PO BOX 220824
CHANTILLY, VA 20153



Kathleen S. Thomas
Kathleen S. Thomas, Director

Status can be verified at <http://www.dpor.virginia.gov>

(SEE REVERSE SIDE FOR PRIVILEGES AND INSTRUCTIONS)

DPOR-LIC (02/2017)

(DETACH HERE)



COMMONWEALTH of VIRGINIA

Department of Professional and Occupational Regulation

CLASS A BOARD FOR CONTRACTORS
CONTRACTOR

CLASSIFICATIONS CIC ESC

NUMBER: 2705120123 EXPIRES: 02-28-2026

MORCOM INTERNATIONAL INC
PO BOX 220824
CHANTILLY, VA 20153



(FOLD)

Cut Along This Line



UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
General Radiotelephone Operator License



Licensee: This is your radio authorization in sizes suitable for your wallet and for framing. Carefully cut the documents along the lines as indicated.

The Commission suggests that the wallet size version be laminated (or another similar document protection process) after signing. The Commission has found, under certain circumstances, laser print is subject to displacement.

FCC Registration Number (FRN): 0035853639

Special Conditions / Endorsements

NONE

Cut Along This

Cut Along This

Grant Date	Effective Date	Print Date	Expiration Date
08-27-2024	08-27-2024	08-27-2024	
File Number	Serial Number	Date of Birth	
0011215255	PG00077650	11-12-1993	

THIS LICENSE IS NOT TRANSFERABLE

(Licensee's Signature)

FCC 605-FRC - August 2021

Cut Along This

Cut Along This

Serial Number	Grant Date	Expiration Date	File Number	Print Date	Expiration Date
PG00077650	08-27-2024		0011215255	08-27-2024	08-27-2024

Date of Birth
11-12-1993
FCC Registration Number (FRN)
0035853639

THIS LICENSE IS NOT TRANSFERABLE
Special Condition / Endorsement:
NONE

PATEL, RAJDEEP
10600 TOSTON LN
GLEN ALLEN, VA 23060

General Radiotelephone Operator License

FCC 605-FRC - August 2021

(Licensee's Signature)
FEDERAL COMMUNICATIONS COMMISSION



Cut Along This

Cut Along This

Cut Along This

S

Safety Base Camp

This card hereby certifies that the holder named has successfully completed following courses and are valid until date shown.

Oscar Olea : 162-018-802-869

AWP Manlift Scissor 1910.67 A92.5 A92.6

6/29/2019

Confined Space

4/5/2022


Executive Trainer



COURSE COMPLETION

iBwave Training Program **RF Fundamentals for Public Safety Networks**

This Certificate is attributed to

Rajdeep Patel

Congratulations on successfully completing the **RF Fundamentals for Public Safety Networks**.



February 28, 2024

mm/dd/yy
Date

François Barbeau
CEO, iBwave Solutions Inc.





CERTIFICATE

OF COMPLETION

iBwave Certification Program

iBwave Design

This Certificate is attributed to

Rajdeep Patel

Congratulations on successfully completing the **iBwave Design Level 2 Certification**.

02/29/2024

mm/dd/yy

Date Issued

Valid for 3 years



François Barbeau, CEO, iBwave Solutions Inc.



Certificate ID: 13922E36F-13913C9CC-12740308B

400, Sainte-Croix Ave., Suite 2100, Montreal, Quebec, H4N 3L4 Canada +1 514-397-0606 - www.ibwave.com



certifies that

OSCAR OLEA

has successfully completed

OSHA 30-Hour Construction

and has earned 3 IACET CEUs and 30 Contact Hours.

This course was developed and presented by ClickSafety.com, Inc.



I confirm that I personally took the
course listed above.

24661307
SERIAL NUMBER

3/13/2018
COMPLETION DATE

30 HOURS
COURSE DURATION

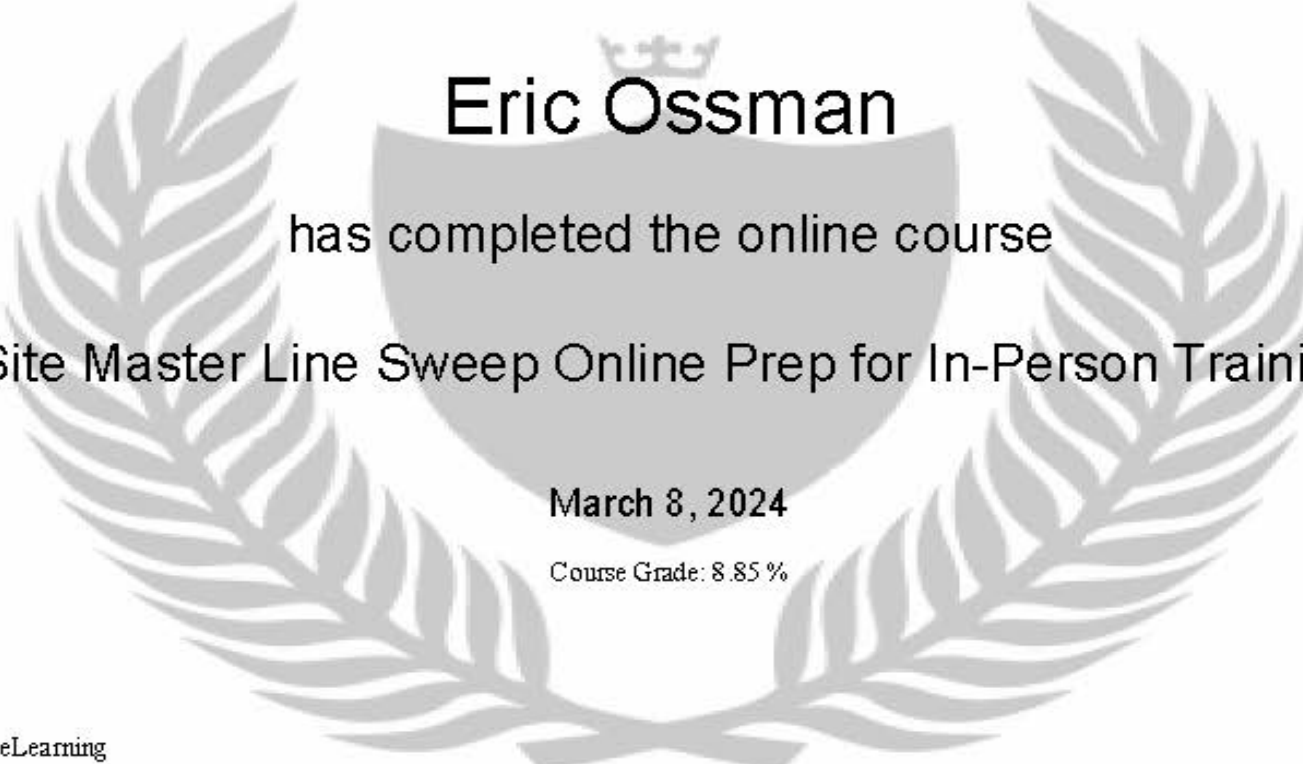
STUDENT SIGNATURE

As an OSHA-Authorized Online Outreach Training Provider, ClickSafety certifies that this Outreach Training Program course was conducted in accordance with the OSHA Outreach Training Program Requirements and Procedures. ClickSafety will document this class to the OSHA Directorate of Training and Education. Upon successful review of the documentation, ClickSafety will provide each student their DOL OSHA card within 90 days of the completion date of the OSHA course. support@clicksafety.com



CERTIFICATE of ACHIEVEMENT

This is to certify that

**Eric Ossman**

has completed the online course

Site Master Line Sweep Online Prep for In-Person Training

March 8, 2024

Course Grade: 8.85 %

Anritsu eLearning

1rkAigsgeU

CERTIFICATE OF ACHIEVEMENT

This certifies that

Daniel McKelvey

has successfully completed

NITF14 - Coaxial Technology Overview


James Donovan
Approval

13th November 2024
Issue Date

13th November 2025
Expiry Date

BM937857US201K06
Certificate

FM-106729-EN © 2024 CommScope, Inc. All rights reserved.

This certificate is a record of training completed and is provided for information purposes only. The certificate shall not be construed to create, indicate, infer or imply any status, partnership, membership of the CommScope PartnerPRO Program or any other relationship between CommScope and the above named company. Furthermore, the above named company does not have any right, power or authority to represent, act, or create any obligations, express or implied, on behalf of or for CommScope. For more details on CommScope's PartnerPro program please visit <https://www.commscope.com/partners/partnerpro-network/>.

Certificate of Factory Training

RAJDEEP PATEL

Morcom International Inc.

has successfully completed training and is hereby certified on

ERCES - VHF, UHF,700/800 - BDA & FIBER DAS CERTIFICATION TRAINING - LEVEL 1

Issued: Friday, November 15, 2024

Expires: Monday, November 15, 2027

Certificate #: ISP/300-2468/250408



Peeran Mukadam

Sr. Director,
Global Learning & Enablement



Harry Barnes

Director, Technical Training

This certificate is valid in the name of the Recipient AND Company together and is rendered Invalid should the two separate OR the distributorship of the Company be revoked for any reason.

Certificate of Factory Training

ERIC OSSMAN

Morcom International, Inc.

has successfully completed training and is hereby certified on

ERCES - VHF, UHF, 700/800 - BDA & FIBER DAS CERTIFICATION TRAINING - LEVEL 1

Issued: Thursday, April 18, 2024

Expires: Sunday, April 18, 2027

Certificate #: ISP/300-2468/237168



Peeran Mukadam

Sr. Director,
Global Learning & Enablement



Harry Barnes

Director, Technical Training

This certificate is valid in the name of the Recipient AND Company together and is rendered Invalid should the two separate OR the distributorship of the Company be revoked for any reason.



TRAINING. COMPLIANCE. YOUR FUTURE.

certifies that

Rajdeep Patel

has successfully completed

OSHA 30-Hour Construction

and has earned 3.00 IACET CEUs

and 30.00 Contact Hours.

This course was developed and presented by
ClickSafety.com, Inc.

As an OSHA Outreach Training Program trainer, I affirm that I have conducted this OSHA Outreach Training Program training class in accordance with OSHA Outreach Training Program requirements. I will document this class to my OSHA Authorizing Training Organization. Upon successful review of my documentation, I will provide each student their course completion card within 90 calendar days of the end of the class.



Rolando Y. Cedillo

Signature of Administrator

I confirm that I personally took the
course listed above.

1230659195

Serial Number

08/10/2023

Completion Date

30.00 Hours

Course Duration

Rajdeep Patel

Student Signature



TRAINING. COMPLIANCE. YOUR FUTURE.

certifies that

Rajdeep Patel

has successfully completed ClickSafety's web-based training course:

Radiofrequency (RF) Safety and Hazard Awareness

This course was developed and presented by ClickSafety.com, Inc.



1210041013

Serial Number

08/05/2021

Completion Date

0.75 Hours

Course Duration

I confirm that I personally took the
course listed above.

Rajdeep Patel

Student Signature

**Luke M.
Technical Program Manager
Morcom International**

Profile

Highly self-motivated **RF engineer (HF to 5G), program and project manager, telecommunications and network designer and instructor**. Proven track record: 26 years' experience in telecommunications and information management, to include site survey, ISP cellular design, commercial sales, critical communications (LMR), military projects and government environments. Excellent academic and work-based qualifications in all areas of telecommunications **systems, service, and project management**.

Professional Experience

Feb 2020 to June 2022 – RF Consultant, ETL Systems

- Technical sales and consultancy for a manufacturer or RF distribution products (splitters, couplers, RF matrix, amplifiers, signal generators, analysers etc) to satellite users in all industries within the US. Working to offer technical advice, network design and appropriate products to all commercial markets, I was able to maintain 2019 sales performance through 2020/21 and doubled turnover for FY 2022 (Company Q3 end) through new and existing accounts. Working closely with customers in engineering, management, and procurement structures, as well as all areas of the ETL team to form close interpersonal relationships and deliver appropriate technical solutions.

Aug 2018 to Nov 2019 - RF network design and Wireless Deployment Manager, Starry Internet.

- Originally employed to conduct RF network design for the new “Pre-5G”, mmWave network for the Washington, DC market, to include microwave and fibre backhaul design, coverage surveys and RF propagation testing. This fast-paced start-up required a wide range of tasks to include site selection and site survey, IP and network management, node configuration, team management, supervision and training, site acquisition, as well as project, process, and knowledge management. Instrumental in establishing the company in the DC metro area.

Jan 2016 to Jan 2017 – General Manager, Electronic Communications Limited

- Responsible for all aspects of running the TETRA public safety network and providing bespoke radio communications solutions, training, and subject matter expertise (SME) to the community. Responsibilities also expanded to business activities such as sales, financial management, marketing, systems innovation, supplier handling and employee development. Project Management duties included technical and project planning, bid creation and presentation for a countrywide public safety and LTE network, to include critical communications, control room and network management facilities. Secured award in 2019 this \$10m contract created the most advanced network of its type in the world.

Summary of Qualifications

- **Present** – Undergoing training and attaining stipulated credits to obtain PMP v.6/7 qualification, following the required years of successful project management experience.
- **Jan 2017:** First Class BSc (Hon) Telecommunications Systems Management degree with Lincoln University (UK).
- **Sep 2009 – Jun 2010:** PRINCE2, ITIL v2 – Foundational project management training in PRINCE 2. ITIL Foundation in service management, to include a full understanding of the ITIL framework and practices.
- **Jan 2009** - Command, Leadership and Management (CLM) Defence qualification at senior level incorporating the supervision, guidance, training, development and command of subordinates, as well as time and resource management within stringent policy and procedural boundaries.

RF and Network Communications - Engineer

NAME:

POSITION:

EDUCATION:

EXPERIENCE:

Morcom International, Inc (December 2008 to Present)

Project Manager:

- RF Interference Investigation Investigation. Led and conducted the investigation at the Arlington Water Pollution Control Plant to determine generation of RF interference caused by electrical equipment over the aeronautical frequency range (118-136 MHz) using state of the art software defined radio receiver (WinRadio WR-G39DDCe). Collected 843GB of spectrum data during a two-week investigation. Arlington County, **VA. - 2025**
- Upgrading Automated Weather Observing System (AWOS) with LLWAS (Low Level Windshear Alarm System). Directed the procurement of equipment, local subcontractors and installation of servers, 7 weather towers, and field sensor equipment for the Norman Manley International Airport. Performed the data integration to their current AMHS system, testing and commissioning of the equipment along with training for operators and maintenance technicians. Delivered to Jamaica Civil Airport Authority. Kingston, **Jamaica. – 2024.**
- Wi-Fi Network System. Led the site surveys, design and installation of 37 Cisco Meraki MR-86 Access points and 11 Cisco managed switches integrated into their Cisco Digital Network Architecture (DNA) to provide Dual Band Wi-Fi service to a network of 2.8 miles of tunnels and galleries underground, housing a diversity of electrical machinery, pipes and water pressure systems. A rugged and unforgiven environment at the Blue Plains Wastewater treatment plant, DC. Delivery to the IT Office of Water and Sewage Authority, **DC Water, DC.- 2024.**
- 3 Automated Weather Observing System (AWOS) CAT III. Led the onsite supervision and technical support for servers' installation, field sensor equipment on both new and old runways for the extension of the Jorge Chavez

International Airport. Performed the https weather data integration to their nationwide network monitoring system NM10 along AMHS/AFTN data integration. All part of integrating the new AWOS into their network infrastructure at the HQ Data Center in Lima. Delivered to **CORPAC (Peru's Airport Authority) 2023.**

- Citizen Broadband Radio Service (CBRS) Private LTE System. Led the installation of 2 eNodeB stations on the roof at the West (2) and East (3) side of the Building CSA3. Consisting of 5 Nokia Band 48 Outdoor FW2QQF eNodeB access points to provide 360° coverage. These units were connected to the Nokia EdgeServers using fiber optic cable. These CBRS devices (CBSD) were added to the Federated Wireless Spectrum Access System (SAS) as part of commissioning. Delivered to **Ingalls Shipbuilding Yard, Pascagoula, MS 2022.**
- 3 Automated Weather Observing System (AWOS) CAT I and one Nationwide Weather Network Monitoring System NM10 (NMS). Technical support to install each AWOS in these International Airports: Arequipa, Cusco and Iquitos cities. Performed the NMS integration, consisting of a Dell EMC vSAN 2-node Cluster on VxRail platform using VMWare Hyper-Converged Infrastructure solution installed at the HQ Data Center in Lima. Established https data integration from the 3 remote airports and AMHS data integration to their existing AMHS system through their Aeronautical Operations Network. Delivered to the Communications & IT Central Office. **CORPAC (Peru's Airport Authority), Peru, 2021.**
- Public Safety BDA Network Monitoring System (NMS). Directed the implementation of a one-stop system monitoring solution to notify and allow access to OUC technicians to check the operational status of Bidirectional Amplifiers (BDA) installed in buildings throughout 230+ locations within the DC District supporting the Public Safety Radio System providing radio coverage during emergency responses. The NMS uses VPN technology compliant with FedRamp, NIST and DC District Cybersecurity guidelines. Services are under contract supporting the Office of United Communications. **OUC, Washington DC, 2021**
- CBRS Private LTE System. Directed the design and installation of the FlexcoreEPC central server, RedLine Ellipse 4G LTE eNodeB band 48 station at the Greenfield Education Center building and a second RedLine Ellipse 4G LTE eNodeB band 48 station at the top of the Greenfield Water Tank and CPE antennas. Performed testing and commissioning to provide wireless Internet access for residential customers. Delivered for the Roanoke Valley Broadband Authority (RVBA). **Roanoke County, VA 2021.**
- CBRS Private LTE & Wi-Fi System. Led the design and installation of the FlexcoreEPC central servers and 3 RedLine Ellipse 4G LTE eNodeB band 48 stations and several CPE antennas in the city to provide Internet access for the Public School System of the **Arlington County, VA 2020.**
- Wind Measurement Reporting System. Directed installation, testing, customer training and commissioning of the system for both Hewanorra International Airport and George F. L. Charles International Airport. **Saint Lucia 2020**
- Voice Communication System (VCS) for Air-Ground ATC radio communications. Directed FAT, deployment and installation. Performed integration to customer's data and telephony network, training and commissioning for Panama's Airport Authority (AAC) at **Malek International Airport, David, Panama, 2020**
- GOES-R Satellite Receiving Ground Station. Directed design, procurement and equipment deployment and installation. Performed testing, integration to customer's network infrastructure and training. Delivered to the Weather Office. **Anglo American, Las Tortolas Copper Mining Center, Chile 2019.**

- Geonetcast Satellite Receiving Ground Station. Led system design, equipment supply, testing, installation and training for the Meteorological Services at Hewanorra International Airport, **Saint Lucia 2019.**
- Vaisala Weather Radar System, Directed onsite technical support for RF equipment installation (Tole, Panama) and integration of data distribution, storage and processing servers at the HQ of **ETESA, Panama City 2019.**
- Automated Weather Observing System (AWOS).Directed installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) at La Aurora International Airport, Guatemala City, **COCESNA-Guatemala HQ 2018**
- Automated Weather Observing System (AWOS). Directed the installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) at Juan Manuel Galvez, International Airport, Roatan. **COCESNA-Honduras HQ 2018**
- Directed the system design, equipment supply, and testing of 3 Aeronautical Telecommunications Information Systems (ATIS) including digital radio transmitters for 3 International Airport in Peru (Piura, Trujillo and Pisco). **CORPAC, Peru Fir 2017.**
- Directed system design, equipment supply, installation, testing, commissioning and customer training for GOES-GRB Satellite Ground Station, including data processing, storage y visualization for 7 remote data display stations at **El Salvador International Airport, El Salvador 2017**
- Directed Automated Weather Observing System (AWOS) installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) at Marco A. Gelabert International Airport. **Panama City, Panama 2016**
- GOES GRB Satellite Ground Receiving Station. Selection and Installation of 4.5m parabolic antenna including satellite imagery processing, storage and data distribution server. **Ligado Networks, Reston, VA US 2016**
- GOES GRB Satellite Ground Receiving Station. Selection and Installation of motorized dual axes 5m parabolic antenna, configuration of the antenna controller. **Library of Congress. Culpeper, VA US 2016.**
- Directed equipment installation, testing, customer training and commissioning of Automated Weather Observing System (AWOS) for 2 International Airports, Juan Santa Maria in San Jose and Juan Oduber in Liberia. **General Directory of Civil Aviation (DGAC), Costa Rica 2016.**
- Directed equipment installation, testing, customer training and commissioning of LLWAS (Low Level Wind shear Alarm System) and Automated Weather Observing System (AWOS) at the Princess Juliana International Airport for the Department of Meteorology. **Simpson Bay, Sint Maarten, 2016.**
- Supported Customer during FAT stage for all conventional weather sensors and data collection platforms for Automated Weather Observing Systems (AWOS) to be installed in 32 Airports in Perú including a Network Management Server for nationwide AWOS monitoring. **CORPAC (Peru's Airport Authority)-Helsinki, Finland 2016.**
- Directed Remote Technical Support to multiple R-IV/WMO customers (airport authorities) for the FTPS migration mandated by US NOAA on GTS's Meteorological Message Switching System (our MESSIR product). - **2015**
- Performed Maintenance Service over operating Automated Weather Observing System (AWOS) at El Salvador International Airport: Part replacement, configuration and calibration of weather sensors - Transmissometer (LT31), Data Collection platform (MAWS301), Thunderstorm sensor (TSS928) Ceilometer (CL31) - **CEPA (Airport Authority), El Salvador. - 2015.**

- Directed equipment supply, configuration, and testing of GTS's Meteorological Message Switching System – MESSIR – WIFS/GIFS for Maurice Bishop International Airport. Grenada's Airports Authority, St. George's, Grenada - 2015
- Directed Aeronautical Telecommunications Information System (ATIS); System design, equipment supply, installation, testing, customer training for 6 International Airports in Peru (Lima, Chiclayo, Cusco, Arequipa, Pucallpa and Tarapoto, **CORPAC, Lima. Perú FIR 2014-2015.**
- Automated Weather Observing System (AWOS). Installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) for both Pisco and Chiclayo Airports in Peru. Peruvian Civil Airport Authority (CORPAC), Pisco and Chiclayo, Peru FIR - **2014**
- Automated Weather Observing System (AWOS). Installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) for Scarlett Martínez International Airport in Panama's Atlantic Coast. Civil Airport Authority (AAC), Rio Hato, Panama - **2014**
- Directed equipment supply, system design, installation, testing, customer training and commissioning of the Integrated Met. Message Switching System MESSIR – WIFS/GIFS. El Salvador International Airport (AIES), CEPA-PNUD – **2013**

Senior Engineer:

- Automated Weather Observing System (AWOS). Installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) for Enrique Jimenez International Airport in Panama's Atlantic Coast. Civil Airport Authority (AAC), Colon, Panama - **2013**
- Automated Weather Observing System (AWOS). Installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS CATI) for Managua's International Airport. COCESNA-INAC, Nicaragua- **2012**
- Team Leader for testing and feedback support of the new SSL/VPN migration over Messir Forecaster workstations distributed in the Caribbean, requested by the US National Weather Service. NOAA - **2012**
- Equipment supply, installation, configuration, testing, customer training and commissioning of GTS's Meteorological Message Switching System – MESSIR – WIFS/GIFS for multiple airport authorities from Antigua & Barbuda, Jamaica, Trinidad & Tobago, Mexico, Peru and other countries. – **2011 - 2012**
- Equipment supply, installation, configuration, testing and commissioning of Automatic HD TV satellite tracking system. **FEMA's** National Response Coordination Center (NRCC), Washington DC. - **2012**
- Installation, configuration, testing, customer training and commissioning of two VSAT ground stations. One for the direct readout of polar low orbit satellites (NOAA's POES) using the H RTP image format and one for direct readout of geostationary satellites (NOAA's GOES) using GVAR image format. Meteorological Office of Quito's Civil Aviation Corporation running the new Quito's International Airport, located in Tababela City, Ecuador. - **2012**
- Automated Weather Observing System (AWOS). Installation, testing, customer training and commissioning of the system including weather sensors and Avimet software package (AVIMET AWOS Customized CAT) for both Bluefields and Puerto Cabezas Airports in Nicaragua's Atlantic Coast. COCESNA-INAC, Nicaragua - **2011**

- Participation in the installation of AWOS CAT III system for the Peruvian Airport Authority –CORPAC, Lima. Peru FIR. Peru - **2010**
- Technical support for MESSIR-ISCS monitoring system for US National Weather Services (NOAA) at Silver Springs, MD. **2010**
- Operation and installation of VSAT ground stations part of the WMO's ISCS and GTS.
- Satellite applications for GOES GVAR and POES HRTTP systems. Configuration of satellite receiver applications and communications equipment.
- Factory customer training at Morcom's facilities and developed FAT/SAT protocols to test POES HRTTP system for the new Quito's airport, **Ecuador. 2010**
- Installation, configuration, testing and customer training for GOES-GVAR VSAT ground station system for the Meteorological Office of the Peruvian Air Force-Lima, **Peru 2010**
- Technical support for MESSIR ISCS customers in the Caribbean Islands, Central America and other clients in Latin America, such as Peru, Argentina, Uruguay, Paraguay, Mexico and Chile. **2010**
- Team Leader of the AE MetNet series product software development team. Integration with Vaisala's TACMET system and WXT510/520 multisensor weather equipment.
- Exhibitor for Morcom International in the AIXM Annual Conference for Civil Aviation. **2010**
- Installation and customer training onsite for AWOS systems.
- Participation in the testing for the Aerodrome Terminal Information System (ATIS) integration system for the Peruvian Airport Authority–CORPAC, Lima. Peru FIR. **2010**
- Technical support team leader for the Integration of the Messir Forecaster workstations distributed in the Caribbean region to the new NOAA's NOAAnet communications system. National Weather Service. Washington-DC – **2010**
- Directed and controlled the diagnostic, removal, transportation and final operation of 40+ pieces of weather data collection equipment to a new operations & testing platform at the Dulles International Airport for NOAA-Sterling Research Facility. Virginia - **2009**
- Software architecture and design using MS C++, MS C#.Net, Java2 SE, Visual Basic.Net, HTML, and XML. NetBeans and Eclipse.

Sovereign Bank – Operations Specialist (2006 – 2007)

- Designed, coded and implemented a system to monitor, analyze, and filter large number of records containing customer's confidential information to comply with the USA PATRIOT ACT established by the US Government.

Northeastern University – DSP Research Assistant (2003 – 2004)

- Assisted in the research of fault detection on squirrel-cage induction motors by developing and coding models to run simulations against experimental data published for the ECE department.

Institute of Public Health –EsSalud (1999 – 2001)

- Chief Manager of the Clinical Engineering Department providing support to the continuous operation of several medical centers ranging from 36 to 200 beds

with a total of 6000+ life support and critical medical devices, and facilities for Lima region.

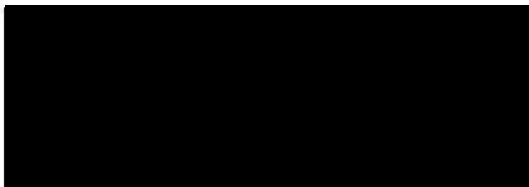
- Participation in the design and implementation of a proprietary software application to control maintenance operations for all medical devices and facilities.

SVC/Engineering & Construction – Assistant Operations (1994 – 1998)

- Project manager of several projects in power distribution systems.
- Assisted the design of the proprietary software application oriented to control maintenance operations for heavy equipment.
- Assisted the design of the proprietary software application to support management construction of projects.

LANGUAGES:

Spanish fluently spoken and written



EDUCATION & CERTIFICATIONS

- | | |
|--|------|
| • CEG of Yoto Togo (West Africa) | 1998 |
| • Certificate of Carpentry | 2001 |
| • Certification of End of Apprenticeship | 2000 |
| • BISCO Technician | 2012 |
| • Certification of Achievement (Systimax Data Center Design and Engineering) | 2015 |
-

EXPERIENCE

Dascom Llc. - Human Urban Development Building – DC

July 2017 – Present

Foreman

- Pull Coaxial Cable and Fiber
- Install Connectors, devices, antennas
- Test cables
- Bend conduits

Custom Computer Cable Inc. (CCCI – Sterling, VA)

2009 – 2017

Cabling Technician, Data Center Technician/Foreman

- Terminate 100+ jacks per day
- Rack and stack
- Install Speakers, Cameras, Room schedulers, Digital Signs, Door alarms, Wireless Access Points (WAPs)
- Check cable wires, poles and amplifiers for problems
- Install fiber optic cable, multimode and single mode
- Test copper and fiber cables to ensure correct working order (DTX Cable Analyzer)
- Lacing and Dressing cable properly for presentation and easy work access
- Diagnose and troubleshoot cable problems
- Perform diagnostic and preventive maintenance measures
- Document test results and safety reports as appropriate
- Plan network installations by studying customer orders, plans, manuals, and technical specifications;
- Establish voice and data networks by running, pulling, terminating, and splicing cables.
- Verify service by testing circuits, equipment, and alarms; identifying, correcting, or escalating problems.
- Document network by labeling and routing equipment and cables; recording configuration diagrams and specifications.
- Maintain network by troubleshooting and repairing outages; testing network backup procedures.
- Maintain customer rapport by listening to and resolving concerns; answering questions.
- Maintain safe work environment by following codes, standards, and legal regulations.

CCCI/Morcom - Fairfax Cty. Public Safety Headquarters

August – September 2016

Foreman

Fairfax Government Center

- Pull Coaxial Cable and Fiber
- Install Connectors, devices, antennas

Central Link Data Center / Lantrovision / USIS Communication

August 2012– August 2015

Foreman

- Decommissioning the old run of multimode fiber optic cables
- Run Single mode fiber upgrading the decommissioned system
- Rack and Stack
- Install new server for the upgrade system
- Channel and Permanent link testing of the new run (DTX5000 Fluke Network Tester)
- Lacing and dressing the fiber optic from the IDF to the different Racks and Stations
- Install Switches and PDUs (Power Distribution Units)
- Terminate Cat6 E
- Test each run of Fiber and verifying every port continuity using the VFL

DGS Airlines Corporation

September 2012 – August 2017

Cargo Runner

Giant Food Store

July 2003 - 2017

Deli Clerk

LYNN-Ray HVAC

August 2006 - July 2007

Helper

Petsmart

October 2004 - December 2006

Stocker

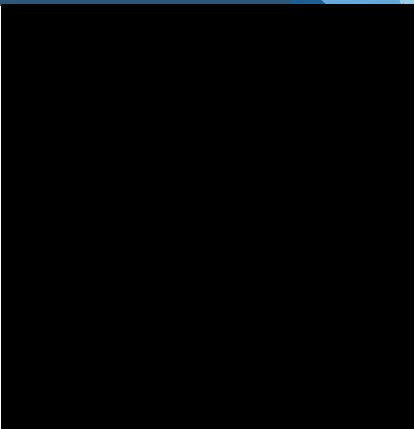
Ross 13065 Virginia

December 2001 - May 2003

Stocker

LANGUAGE

- English (Fluent)
- French (Fluent)
- Ewe (Fluent)



11/1/22–Present

RF Engineer • Design Engineering • Morcom International, Inc.

11/1/15–8/31/18

Senior Q & A Manager-WiFi • Design and Performance Engineering • Volanno/Amtrak

1/1/15–10/30/15

RF Design Engineer• In Building LTE Design • GDNSites/Verizon

11/2/2010–11/18/2014

RF Engineer II• RF Engineer/Project Management • Sprint

12/1/2007–11/1/2010

Managing Partner• RF Engineer/Project Management • Ossman Consulting Group (OCG)

9/01/1999–11/1/2007

RF Engineer II, III, IV and RF Regional Manager • Nextel Communications and Nextel Partners

RF Engineer with vast experience in the Wireless Communication Industry. My career encompasses a broad spectrum of industry knowledge ranging from market level customer facing engineering to global corporate level communication initiatives. The majority of my experience has been centered in the cellular carrier space. Focusing on all aspects of RF Engineering; disciplines including design, build, deployment, optimization and performance. Projects varying from single cell site builds to major venue and facility systems including micro, macro, small cell and DAS networks. Apart from the Cellular industry, my career has explored satellite communications, public safety systems, Wi-Fi and high-speed rail communications.

Notable DAS Projects

Ford F150 Truck Plant
Ford Explorer Truck Plant
Chevrolet Corvette Plant
Toyota Camry Plant
John Deer Equipment Facility
Churchill Downs Facility
3 TVA Power Plants
WMATA Dulles Tunnel System

Notable Network Projects

Amtrak Acela and Northeast
Regional Fleet Wi-Fi Upgrade
Decommissioning of the iDEN
Cellular Network
Deployed over 200+ Cell Sites
Creation of a National Cellular
Carrier Competitive
Benchmarking Report
Amtrak FCC Wi-Fi Waiver

Leadership

During my tenure as RF Manager of Nextel Partners Mid-West Region; I managed 17 Design and Performance engineers. Our team was deployed across 6 markets spanning Indiana, Kentucky and Illinois.

Technical Skills

I am proficient with numerous design propagation software tools including iBwave, Atoll and Planet. As well as RF performance data collection and post processing tools with most recent experience with AirMagnet and TEMS software for RF networks. Additional skills include proficiency with Operational System Support (OSS) tools including Solarwinds and PRTG Network Monitor.

[REDACTED]

[REDACTED]

Dynamic I.T. Support Engineer with over a decade of experience in technical support, systems administration, and network engineering. Demonstrates expertise in troubleshooting, configuring, and maintaining Windows and Unix/Linux environments, managing LAN/WAN networks, and providing exceptional end-user support in Active Directory (AD) environments. Skilled in infrastructure setup, equipment lifecycle management, and delivering robust technical solutions for government, enterprise, and private-sector clients. Adept at incident response, change management, troubleshooting complex technical issues, managing production and development environments, and ticketing systems, while adhering to security protocols and regulatory compliance standards to deliver solutions that meet organizational objectives. Passionate about leveraging technology to optimize performance and deliver reliable solutions for organizational growth in diverse technical environments.

Professional Experience

Morcom International Inc. | Chantilly, VA

Network Field Engineer | August 2022 – Present

- Lead I.T. and network support initiatives, ensuring seamless installation and maintenance of Wi-Fi, broadband, DAS, and RF communication systems for government and private facilities.
- Coordinate multi-disciplinary teams to deliver secure communication solutions under ISO-9001 standards.
- Optimize network productivity through IoT device integration and data monitoring, enhancing compliance and performance metrics.
- Manage network hardware, including routers, switches, WAPs, and DAS components, ensuring system integrity and reliability.
- Prepare comprehensive technical documentation and audits using Microsoft Office 365 to support project transparency and organization.

Amazon Web Services (AWS) | Herndon, VA

Network Build Tech/Engineer | May 2018 – June 2021

- Configured and maintained Linux/Unix systems for server rack deployment, including EC2 cloud infrastructure and DWDM technologies.
- Developed and implemented Bash scripts to automate system configurations, reducing manual tasks and improving system reliability.

- Conducted performance tests on network hardware and software, integrating Linux tools for efficient monitoring and diagnostics.
- Collaborated with cross-functional teams to deploy and manage AWS proprietary devices, including routers and switches.
- Monitored and verified network functionality using Mobius Workflow Automation and performance testing tools (Fluke Networks, Power Meter).

Virtustream Dell EMC | Vienna, VA

Data Center Tech/Engineer | July 2016 – May 2018

- Provided onsite and remote technical support for mission-critical data center operations, resolving an average of 5+ tickets daily via ServiceNow.
- Ensured system uptime and security by conducting routine maintenance, hardware replacements, and rack management for enterprise-grade equipment.
- Collaborated with vendors and internal teams to deliver efficient and timely troubleshooting, enhancing service reliability.
- Prepared and interpreted technical manuals, blueprints, and schematics for equipment installations and modifications.

Self-Employed | Alexandria, VA

Digital Marketing & Trading | June 2021 – August 2022

- Developed and managed digital platforms (websites, social media) to market and sell products, boosting customer engagement.
- Conducted trading of digital assets and taught others about blockchain technologies, including Web3 protocols and cryptocurrency fundamentals.
- Built a custom Bitcoin node using Raspberry Pi for decentralized transaction management and data collection.

Core Competencies

Technical Support: Expert in diagnosing and resolving technical issues, ensuring high user satisfaction.

System Administration: Proficient in managing Windows, Unix/Linux environments, and Active Directory.

Networking: Skilled in configuring, administering, and troubleshooting LAN/WAN and wireless networks.

Documentation & Compliance: Adept at creating accurate technical documentation and adhering to regulatory standards.

Tools & Technologies: Experienced with monitoring systems, automation tools, and scripting for operational efficiency.

Technical Skills

Hardware: Routers, Switches, Servers, WAPs, CAT5/6/6A, Fiber (SM/MM), SFPs, SSDs, CPUs, RAMs, RAIDs, DAS components (Bi-Directional Amplifiers, Antennas)

Software: Linux/Unix, Cisco IOS, VMware, Oracle VirtualBox, Microsoft Office 365, Ignition SCADA, ServiceNow

Networking: LAN/WAN, TCP/IP, VLAN, ICMP, VPNs, SSH, DHCP, DNS, NAT, SNMP, RF testing, DAS configurations

Operating Systems: Linux (Red Hat, CentOS, Ubuntu, Kali), Windows Server

Protocols/Standards: IEEE 802, ISO-9001, IoT integration, cybersecurity best practices

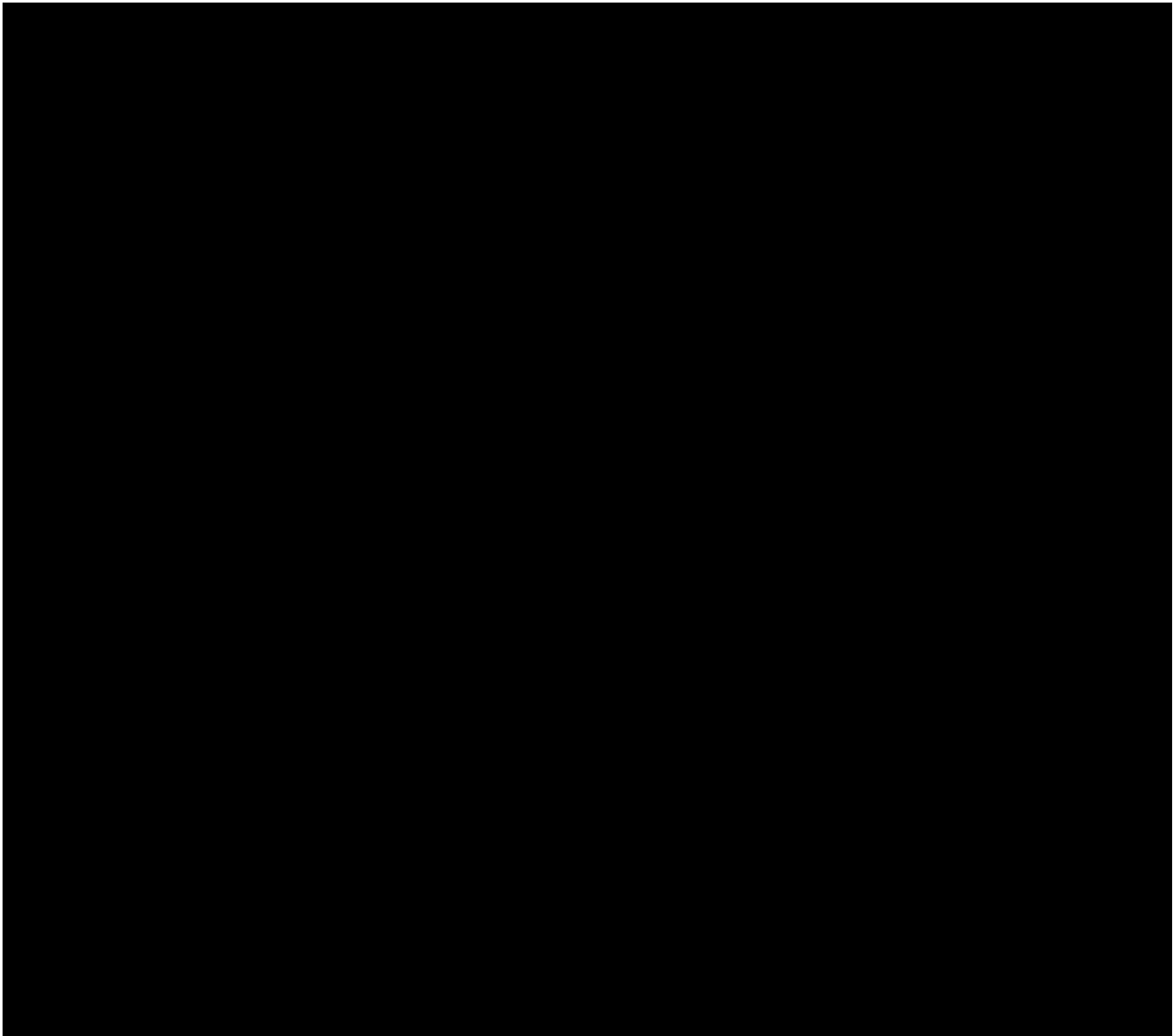
Education & Certifications

- **Linux+** | CompTIA
 - **RHCSA** | Red Hat Enterprise Linux
 - **Python 3** | Python Institute
 - Advanced coursework in Networking, System Administration, and Cloud Computing
-

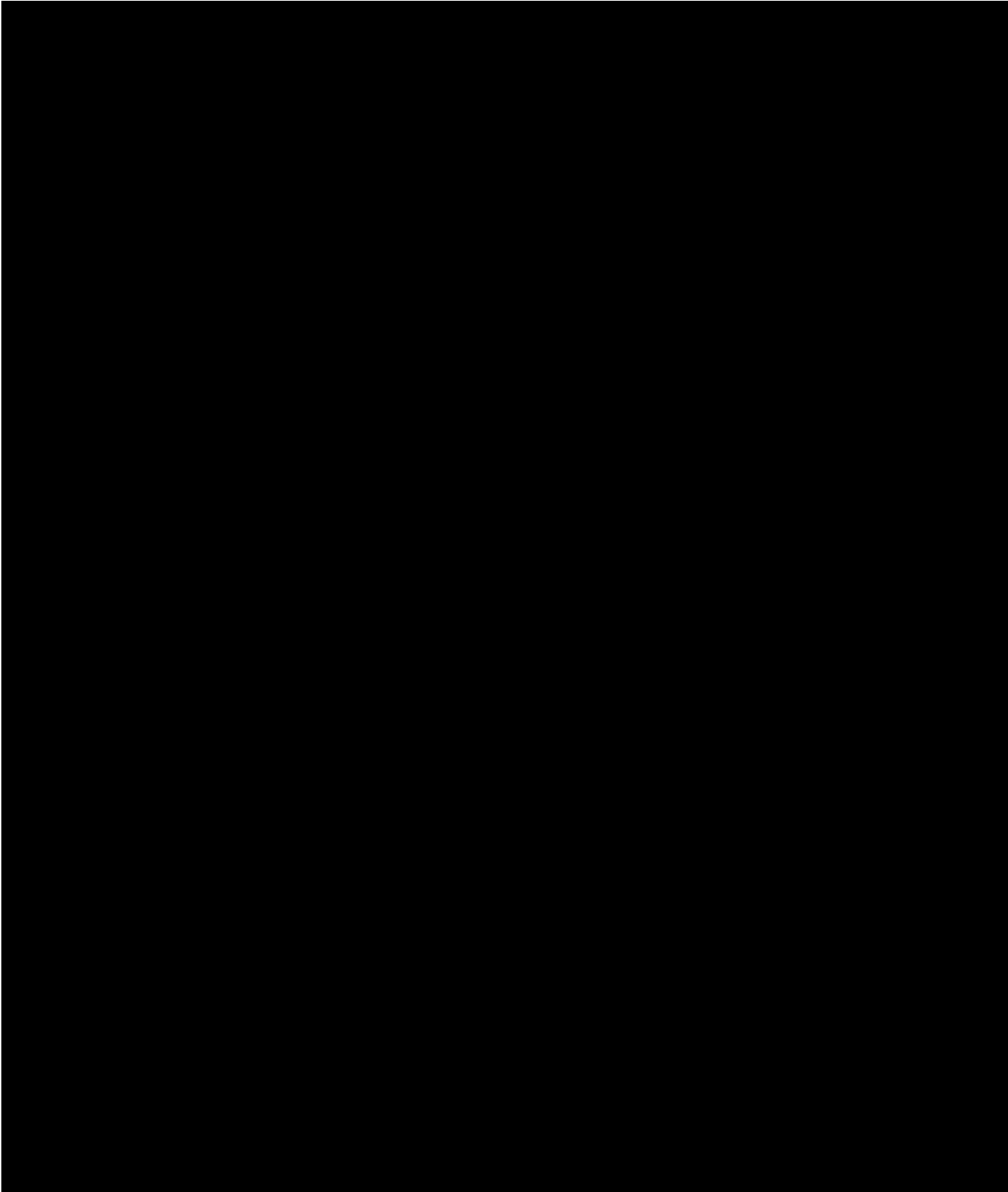


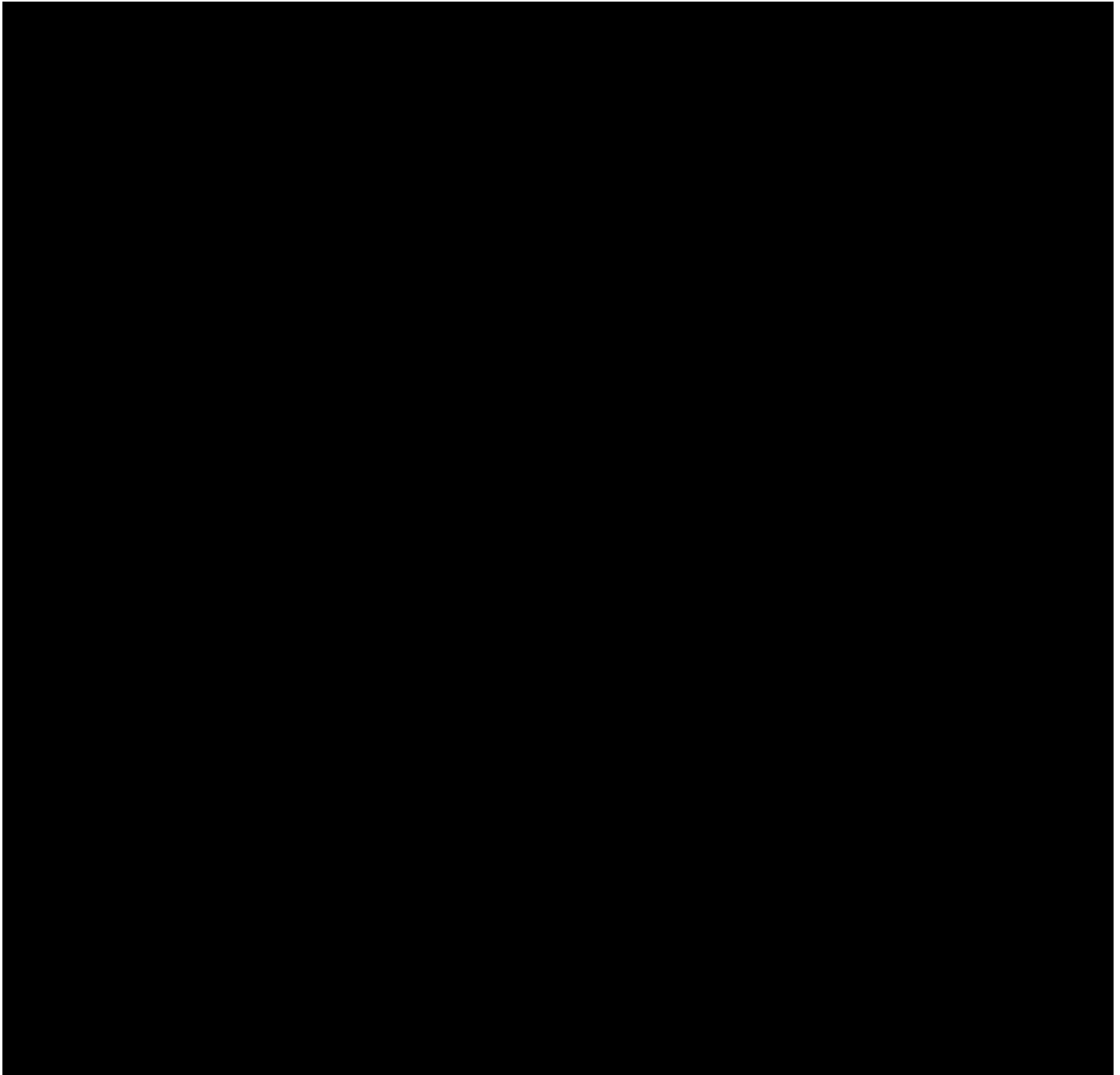
Distributed Antenna System

Maintenance and Service Plan



The information included in this proposal is of a confidential nature and is to be used only for the purpose intended. The information is not to be duplicated, copied, or recreated for any other purpose other than for the purpose of this proposal.







Request for Proposal

RFP# KBF-1239

**Public Safety Distributed Antenna System
(DAS)**

October 30, 2025

**NOTE: The university will be closed
Thanksgiving Break: November 24-28, 2025
Winter Break: December 22, 2025 - January 2, 2026**



REQUEST FOR PROPOSAL

RFP# KBF-1239

Issue Date: October 30, 2025

Title: Public Safety Distributed Antenna System (DAS)

Issuing Agency: Commonwealth of Virginia
James Madison University
Procurement Services MSC 5720
752 Ott Street, Wine Price Building
First Floor, Suite 1023
Harrisonburg, VA 22807

Period of Contract: From Date of Award Through One Year (Renewable)

Sealed Proposals Will Be Received Until 2:00 PM on December 10, 2025 for Furnishing the Services Described Herein. (See Special Terms & Conditions “D. Late Proposals”)

SEALED PROPOSALS MAY BE MAILED, EXPRESS MAILED, SUBMITTED IN eVA, OR HAND DELIVERED DIRECTLY TO THE ISSUING AGENCY SHOWN ABOVE.

All Inquiries for Information and Clarification Should Be Directed To: Katie Forsyth, Buyer Senior, Procurement Services, forsytkb@jmu.edu; 540-568-5113; (Fax) 540-568-7935 not later than five business days before the proposal closing date.

NOTE: THE SIGNED PROPOSAL AND ALL ATTACHMENTS SHALL BE RETURNED.

In compliance with this Request for Proposal and to all the conditions imposed herein, the undersigned offers and agrees to furnish the goods/services in accordance with the attached signed proposal or as mutually agreed upon by subsequent negotiation.

Name and Address of Firm:

By: _____
(Signature)

Name: _____
(Please Print)

Date: _____

Title: _____

Web Address: _____

Phone: _____

Email: _____

Fax #: _____

ACKNOWLEDGE RECEIPT OF ADDENDUM: #1 _____ #2 _____ #3 _____ #4 _____ #5 _____ (please initial)

SMALL, WOMAN OR MINORITY OWNED BUSINESS:

☐ YES; ☐ NO; IF YES ⇒ ☐ SMALL; ☐ WOMAN; ☐ MINORITY IF MINORITY: ☐ AA; ☐ HA; ☐ AsA; ☐ NW; ☐ Micro

Note: This public body does not discriminate against faith-based organizations in accordance with the Code of Virginia, § 2.2-4343.1 or against an offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

REQUEST FOR PROPOSAL

RFP # KBF-1239

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I. PURPOSE

The purpose of this Request for Proposal (RFP) is to solicit sealed proposals from qualified sources to enter into a contract to provide Public Safety Distributed Antenna System (PS DAS) installation and maintenance services for James Madison University (JMU), an agency of the Commonwealth of Virginia. Initial contract shall be for one (1) year with nine (9) one-year renewals.

II. BACKGROUND

James Madison University (JMU) is a comprehensive public institution in Harrisonburg, Virginia with an enrollment of approximately 22,000 students and more than 4,000 faculty and staff. There are over 600 individual departments on campus that support seven (7) academic divisions. The University offers over 120 majors, minors, and concentrations. Further information about the University can be found at the following website: www.jmu.edu.

The JMU Telecommunications Department is responsible for providing and maintaining all voice and video communications for campus facilities as well as installing and terminating the physical layer of the data communication network. The department is also responsible for managing and coordinating all Radio Frequency related activities on campus.

The university is committed to being a safe place to work and learn and has determined to install infrastructure and equipment to support public safety communications in new buildings and major renovations. PS DAS of various manufacture and design are currently installed in twenty buildings on campus. Installed systems support not only public safety functionality but also day-to-day operational radio use by university staff in both 800MHZ and 450MHZ frequencies. (See *Attachment H – JMU DAS Inventory*).

III. SMALL, WOMAN-OWNED AND MINORITY PARTICIPATION

It is the policy of the Commonwealth of Virginia to contribute to the establishment, preservation, and strengthening of small businesses and businesses owned by women and minorities, and to encourage their participation in State procurement activities. The Commonwealth encourages contractors to provide for the participation of small businesses and businesses owned by women and minorities through partnerships, joint ventures, subcontracts, and other contractual opportunities. *Attachment B* contains information on reporting spend data with subcontractors.

IV. STATEMENT OF NEEDS

James Madison University desires to partner with a Contractor or multiple Contractors to maintain existing PS DAS systems, install and maintain new PS DAS, and provide other Will-Call services related to the installation, maintenance, and repair of PS DAS systems. Offerors and any Offeror subcontractors must provide manufacturer and industry certifications and have a verifiable track record of skill and proficiency in providing the desired services.

Labor will be solicited as the needs of the University dictate. This could be in the form of requesting a quote for a job in total or labor to supplement ongoing maintenance efforts including emergency repairs. For jobs that require a proposal submittal, the Offeror should carefully consider the amount and character of the work to be done, as well as the difficulties involved in its proper execution. Offeror should include in their proposal all costs deemed necessary to cover all contingencies essential to successfully installing the specified solution. Any cost not specifically itemized in the proposal shall not be incurred unless specifically agreed upon, in writing. No claims for

compensation will be considered or allowed for extra work resulting from oversight of any existing conditions on the part of the Offeror. Acceptance shall be subject to completion of all work, successful post-installation testing yielding the specified pass ratings, and receipt of all deliverables.

JMU Requests Offeror to provide optional pricing in *Pricing Schedule* Section X. for vendor monitoring of on-campus DAS Systems.

A. General

Describe in detail Offeror's approach to each of the following items. Provide as much detail as required to adequately respond and/or state Offeror's willingness to comply. Failure to provide responses to the items below may result in rejection and return of the proposal.

1. Provide a concise description of your organization. Include information on general organization, staffing, and experience in maintaining and upgrading systems/networks of comparable size. Include references and contact information in *Attachment A* "Offeror Data Sheet".
2. Provide a list of certifications/qualifications for permanent staff members that may be assigned to perform work at James Madison University.
3. Provide a Word copy of any service agreement language or relevant software licensing with your response.
4. If intending to use subcontractors in the fulfillment of any part of the contract, indicate the part(s) where subcontractors will be used, provide a list of subcontractors, and provide references. NOTE: Subcontracting may require reporting for SWAM vendors, see Special T&C VIII.J. *Small Business Subcontracting and Evidence of Compliance* and *Attachment E* sample submission form.
5. Indicate Offeror's ability to furnish all necessary labor, supervision, tools, labeling and other equipment, testing and certification devices, to install, maintain, and repair PS DAS Systems.
6. Provide a list of equipment owned by the Offeror and/or Offeror's subcontractors to be used in fulfilling the contract. Include any calibration certificates.
7. Normal working hours for JMU are from 8:00 a.m. to 5:00 p.m., Monday through Friday, except observed holidays. Capital construction projects may require that the selected Contractor work a flexible schedule which may be defined by the General Contractor of that capital construction project. This may include, but is not limited to, a flexible workday or a flexible work week in order to meet fluctuating deadlines. **State Offeror's ability to meet these requirements.**
8. Changes to scope can only be initiated and/or issued by JMU Telecom and must be tracked via a formal change order process. Invoices shall only be satisfied for the original scope of work and approved change orders. Invoices must include copies of the executed change order. **Describe Offeror's process for change orders and provide a copy of your standard change order form.**
9. Hours for work performed under this contract shall be paid only for productive time on the job site. Time spent for transportation of workers, handling and delivery of

Contractor owned or rental equipment, and breaks for lunch or other time the employees are away from the job site is not chargeable. **State Offeror's ability to meet these requirements.**

10. JMU can provide secure space for advanced shipping and staging of project material. The Offeror is responsible for maintaining inventory of project material through completion of the project and for transporting material from JMU storage facility to the job site. **State Offeror's ability to meet these requirements.**
11. Maintain project sites to be clean and tidy throughout the workday. Debris generated by the Offeror is picked up and lawfully disposed of at the conclusion of each workday. Offeror may be responsible for removing and laying aside ceiling tiles during the installation, depending upon the scope of work. Offeror shall place ceiling tiles back in place by the end of each workday. **State Offeror's ability to meet these requirements.**
12. Initiate, maintain, and supervise all safety precautions and programs in connection with the work. This includes attending required safety training by JMU or its General Contractors and adherence to OSHA standards including, but not limited to, confined space procedures. **State Offeror's ability to meet these requirements.**

B. New Installations

At some point during the life of the contract, JMU will purchase one or more PS DAS solutions. The purchases will often coincide with and be procured through the university's Capital Construction process. A specific New System quote will be requested at that time. While all of the PS DAS solutions on campus to date have been Passive systems, JMU Telecommunications Department is not predisposed to, and has no preference for, any particular type of system (active or passive) or manufacturer model or brand. Offerors are encouraged to present as many strategies and products for meeting the stated needs as they desire. Offerors who wish to submit multiple strategies or products should indicate which strategy and product(s) best meet the needs stated and note the Offeror's best capability. Offerors are strongly encouraged to make great effort to point out best practices and solution feature sets that distinguish the Offeror and their proposed solution(s) from the competition.

1. Design

Offerors(s) will be asked to turnkey design, install, and commission PS DAS in accordance with JMU's standardized PS DAS design specifications. See *Attachment F*.

Any variances, discrepancies, or additional requirements from this standardized specification for JMU DAS/BDA Systems will be addressed in the corresponding sections of a separate but specific site related Scope of Work which will be issued prior to the time of procurement for any DAS/BDA design for new building, building refresh or system upgrade.

- a. State Offeror's ability to design and install systems to the design specs as indicated in *Attachment F*.
- b. Provide examples of work performed that indicate Offeror is capable of providing the services requested. Include relevant certifications.
- c. Detail Offeror's design process. Include tool sets used and state deliverables beyond those required in JMU's design specification.

- d. During design and periodically throughout construction, acknowledge that Offeror shall commit to perform regular site surveys in order to:
 1. Understand existing and/or changing site conditions, nearby DAS systems and the local RF environment to anticipate possible impacts to the future system design and to eliminate unforeseen conditions;
 2. Understand any limitations associated with antenna mounting, cable routing, equipment spaces and placement, and power outlets;
 3. Inspect condition of grounding equipment;
 4. Understand on-site signal levels within the building as the structure is enclosed;
 5. Collect all necessary physical site information.

State your ability to meet these design conditions.

2. Proposed Solution(s)

- a. Proposed solution(s) must be in new condition for hardware and software. They must be sufficient to meet the needs of the university and be serviceable and supported in the condition sold by the manufacturer for five years from the date of sale.
- b. State as succinctly as possible the overall strategy(s), solution(s), etc. that Offeror is proposing to provide under this contract.
- c. Provide a list of base manufacturer(s) and model(s) you are proposing under this contract.
 1. Indicate whether proposed solution(s) is an Active or Passive system.
- d. Provide a list of any peripheral components you are proposing under this contract.
- e. Provide a letter of certification from the manufacturer authenticating the Offeror's and/or Offeror's subcontractor's qualifications and authorization to sell, distribute, install, warranty and service for all proposed solutions and peripherals.
- f. For each proposed solution(s), provide minimum and maximum area of coverage in square feet.
- g. For each proposed solution, provide average installed cost per square foot and detail price point breaks where costs per square foot coverage is impacted by economy of scale.
 - (1) In Pricing Structure of proposed solutions, indicate MSRP pricing and JMU discounted pricing for each proposed solution. Indicate installation labor rates and how installation labor is calculated. **Detail pricing in Section X. Pricing Schedule.**
- h. Using proposed pricing structure, provide a sample quote for a solution providing PS DAS to all stories of a representative four story, 40,000 square foot building (See *Attachment G – Sample Building Drawing*).

Assume the following:

- Line of sight to donor source exists
- EPDM Roofing
- Brick Exterior
- Low E Glass Exterior Windows
- Steel Frame w/Metal Studs
- Standard Sheet Rock Wall Finish
- Concrete Floors
- RSSI Readings on the roof for required frequencies is -85dB.
- RSSI throughout the interior of the building are -120dB.

State your ability to meet these proposed solution(s) conditions.

3. System Installation. **Acknowledge agreement to each of the following:**

- a. All equipment and materials shall remain the responsibility of the contractor until it is permanently installed and the installation approved by JMU, the Authority Having Jurisdiction (AHJ).
- b. Contractor commits to using industry, manufacturer, and JMU installation best practices during the fulfillment of this contract. Should a conflict arise, Contractor agrees to work with JMU to determine and adopt the higher standard.
- c. Contractor acknowledges that any required programming, alignment, and service software shall be supplied. All programming software shall be the latest version and be licensed to JMU.
- d. Prior to the commencement of site work, Contractor shall coordinate with the JMU IT Telecom Project Manager, to assure compliance with any special provisions applicable to the site, i.e. safety training, etc.
- e. All rubbish and debris associated with site preparation, unpacking of shipping material, and/or the installations related to this project, shall be removed from the premises daily by the Contractor.

4. Commissioning

Commissioning and Commission Testing is conducted by the Contractor in the presence of JMU Information Technology Telecom (JMU ITT) with results submitted to JMU Project Manager (PM) and JMU ITT for validation through inspections and verification performed by JMU Facilities Management (FM) and JMU ITT in cooperation with JMU Police Department (PD) and AHJ. JMU Telecom will schedule final commissioning with the AHJ and Contractor. At a minimum JMU has identified the following activities to be conducted as part of system commissioning.

State Offerors ability to comply with and perform the following. Provide any additional recommended commissioning testing procedures/activities. Provide a sample of Offeror's standard commissioning document(s).

- a. JMU may be required to use a specific commissioning document(s) (NFPA 72-ERCES) as dictated by the Commonwealth of Virginia or JMU's Capital Planning

and Construction program manager. **State Offeror's willingness to use that document.**

- b. Hardware Installations will be subject to inspection by JMU PM, JMU ITT and JMU FM Engineering for compliance with this specification. **State Offeror's acknowledgement of this condition.**
- c. The Contractor shall be required to provide current documentation of the results of their BER testing of the as-built system at the time of the system commissioning to JMU ITT for system as-built archives in IBWC/IBX file format both WITH and WITHOUT grid overlays. IBWC files shall show DAS hardware locations and designators. **State Offeror's acknowledgement of this requirement.**
- d. Test all coax runs after connectors have been installed for return loss to the following specification:
 - 1. -25 dB return loss or lower across the frequency band of 450 to 862 MHz, with a precision 50 ohm load terminating the coax under test at the far end of each coax tested.
 - 2. Tabulate test results and plots for submission for approval.
 - 3. Tune repeater for gain and channel and filter bandwidth settings. For 800 MHz frequencies, narrowband, minimal delay filter mode is to be employed; filter bandwidth is to be 50 kHz, 31 second delay. Narrow bandwidths shall be used for UHF as well. Determine and install any uplink overload attenuators beyond any shown on the drawings to avoid uplink front end overload (-30 dBm peak uplink signals into repeater). Document all settings for submittal as part of the maintenance baseline document. Note that particular care needs to be taken to not radiate excess uplink noise back to the 800 MHz BTS site. Uplink noise figure of the BTS from this repeater shall be increased by less than 0.2 dB OR by a LOWER amount if required by the AHJ. The use of the uplink muting feature in the repeater may be required.
 - 4. Measure and record isolation between indoor antennas and outdoor antennas for both UHF and 800 MHz bands. Document for submittal as part of the maintenance baseline document.
 - 5. Record input spectrum from donor antenna on spectrum analyzer showing at least one channel in the active state in both UHF and 800 MHz systems, to show input downlink power levels. Use the spectrum analyzer on Max Hold for at least 30 minutes to detect any other strong potential interfering signals coming in from the donor antennas. (Cellular signals in the 862-894 MHz range are of particular concern and must be documented.) Document for submittal as part of the maintenance baseline document.
 - 6. Record repeater downlink output spectrum on spectrum analyzer showing at least one Harrisonburg-Rockingham County system channel in the active state, to show output downlink power levels. Document for submittal as part of the maintenance baseline document.

State Offeror's acknowledgement of this requirement.

- e. Call quality tests must be met with the final system gain settings.
 - 1. If settings are changed after the call quality tests by more than 3 dB (to meet 800 MHz base site noise figure requirement as an example), then the call quality acceptance test procedure must be repeated. **State Offeror's acknowledgement of this requirement.**
- f. Downlink Coverage Levels - The facility shall be tested for coverage levels and to ensure proper system settings and connections as follows:
 - 1. A test antenna and spectrum analyzer shall be used to measure control channel power radiated from each of the system's indoor antennas for the 800 MHz system. The test antenna brand/model must be documented, and may be a test antenna with known gain, or the same antenna as specified for indoor omnidirectional antennas in this specification and is to be connected to the spectrum analyzer input via short jumper with loss of < 0.5 dB at 850 MHz.
 - 2. For indoor system antennas within 10' of the floor level, the test antenna shall be placed in as clear an area as possible at distance of 10' +/- 1' from the system antenna under test, and as close to the same horizontal plane as the antenna under test, and no more than 3' below the antenna under test. The level of the control channel on the spectrum analyzer shall be recorded.
 - 3. For indoor system antennas that are more than 10' above the floor, make the measurement at a location where the test antenna is within the specified vertical beam width of the antenna under test. Record both the spectrum analyzer reading and the horizontal distance between the test antenna and the system antenna under test. Note the test location in sufficient detail so that the test can be repeated as part of maintenance measurements.
 - 4. Care must be taken in spectrum analyzer bandwidth, detection, and sweep speed settings, as well as test antenna polarization, to ensure that the digital control channel levels are accurately displayed. 'Max hold' shall be used for recording the levels in systems that do not employ a control channel.
 - 5. These spectrum analyzer results must be compared with the computed EIRP from the systems antennas plus computed distance loss. Any deviation more than +/- 10 dB requires investigation as to the cause, and rectification of any problems found. Any antenna requiring fixes to meet this requirement must be re-tested after any repairs.
 - 6. These spectrum analyzer test results, along with the computed EIRP's from each antenna, are to be submitted as part of the final documentation. They can be in tabular or building plan view format. Note any non-standard test locations in sufficient detail so that the test can be repeated as part of maintenance measurements.

State Offeror's acknowledgement of this requirement.

- g. Interferer and Repeater Filtering Tests:
 - 1. Provide spectrum analyzer readings for the main repeater output in the downlink direction, showing any strong in-band signals that are not part of the JMU UHF

system or the Harrisonburg-Rockingham County Regional 800 MHz trunked system. For the UHF band, use of Max Hold for at least 30 minutes during the hours of 8 AM to 5 PM local time is required for this test. For the 800 MHz band, show the frequency range of 851-894 MHz for at least 30 minutes in the same time period. A coupler on the repeater output may be used to prevent spectrum analyzer damage; the value of any such coupler used must be documented.

2. Use of the repeaters internal spectrum analyzer function is not acceptable for these tests. However, such plots can be included as supplementary information.

State Offeror's acknowledgement of this requirement.

- h. Uplink Noise Figure Checks for 800 MHz Base Station sites.
 1. Confirmation from the AHJ must be received that no excess increase in uplink noise figure at the base station sites is being received after this DAS is put into operation. Target increase is to be less than 0.2 dB OR by a LOWER amount if required by the AHJ. ATP call quality tests must be met with the final uplink gain settings.

State Offeror's acknowledgement of these commissioning requirements.

5. Acceptance

User Acceptance Testing is performed by JMU ITT, JMUPD, and the AHJ to be approved by JMU ITT, AHJ, and Virginia State Fire Marshall (VSFM) with documentation provided by Offeror and JMU PM.

Contractor shall coordinate testing with the JMU IT Project Manager ONLY.

Testing team will include representatives from the Contractor, JMU IT Telecom, JMU Police & Safety, and Local Public Safety Providers (AHJ) including Harrisonburg Rockingham Emergency Communications Center (HRECC) to ensure acceptable coverage and delivered audio quality to UHF & 800 Mhz System Users that operate within the coverage area.

JMU ITT will utilize their PCTel SeeGull IBFlex RF Scanner when available to test and document DAS coverage and signal strength in facility and/or manually perform Call Quality Tests as necessary to verify coverage area and actual signal strength meets established levels and Delivered Audio Quality (DAQ) specifications for acceptance by JMU and AHJ.

JMU ITT will use facility floorplan files provided by offeror in IBWC/IBX file format with grid overlays used to test general areas and to designate critical coverage areas.

JMU acknowledges that DAQ testing is subjective but believes there is clear distinction between the levels of DAQ as defined. JMU will work with all evaluators to form consensus of delivered DAQ.

At a minimum JMU has identified the following user acceptance testing activities. **Based on Offeror's proposed solution, provide any additional recommended procedures.**

- a. Call Quality Tests are to be conducted as follows:

1. Call Quality tests are to be conducted in all areas of the facility.
 - a. Most areas are to be tested as grid areas.
 - b. Critical individual spaces smaller than the grid size but larger than closets, are to be tested individually.
 - c. Testing may be done by individual room if their size and usage dictates and/or if building design makes it necessary to document specific room coverage.
 - d. Side halls (<20' long) may be tested as part of the grid.
2. Grid tested areas: Test point number and location.
 - a. Divide the grid tested areas into grid spaces sized 20' x 20' for confined individual office or academic spaces or 50' x 50' for general use open air arenas and parking structures or another pre-approved grid size) Each grid space is to be tested in its approximate center, and the test call within a grid space must exceed DAQ 3.4 for the grid space to pass.
 - b. Call quality of minimum DAQ 3.4 is to be recorded in each test grid area for both 800 Mhz and UHF on a DAQ Scale Score rating (i.e. – 3.4 or 4.0).
 - c. Propagated 800 Mhz Signal Strength at each test site should also be recorded in -dBm as indicated on Radios used for testing or Spectrum Analyzer.
3. Hallway testing: Test point numbers and locations.
 - a. Each major connecting hallway is to be tested every 30' along its length. Test in the center of the hall, and each test call at a hall test point must exceed DAQ 3.4 for the location to pass.
4. If a call fails in a grid space or individual area, then that grid space or individual area is to be re-tested in the center of smaller areas of approximately 10'x 10' each. The whole grid space or area is to be recorded as failed if this test fails in 2 or more of the 4 quadrants.
5. The system passes if the average of 95% or more of the test locations pass at a DAQ 4.0. If the system does not meet the targeted 95% requirement for DAQ 4.0. JMU ITT will have the option of accepting the system if it meets minimum of at least a DAQ 3.4 as required by AHJ, but must sign a letter of variance explaining why DAQ 4.0 was not achieved or JMU ITT may require the contractor to make necessary improvements to the system to achieve the overall DAQ 4.0 as specified in JMU's initial requirements.
6. Any calls that do not go through due to a system busy condition are not counted as pass or fail.
7. At JMU ITT discretion, call quality tests may be required and are to be conducted with multiple radios (4) provided by the AHJ that are in known good operating condition, and that meet specified power output, frequency accuracy, and receive sensitivity, and shall include at least one portable radio operated on-

site in the test grid on 800 Mhz JMU ADM, a second portable radio on-site in close proximity to the test grid on JMU UHF ADMIN frequency, a third portable or mobile radio operated off-site operating on 800 Mhz JMU ADM and a radio console or remote control station operated from a communications center on the 800 Mhz JMU ADM talk group and on UHF JMU ADMIN.

- a. This methodology will allow the multiple evaluators to test and record DAQ across both bandwidths simultaneously through the established gateway that links the two together.
- b. Baseline testing should be done on each individual talkgroup/frequency, 800 Mhz (JMU ADM) and JMU UHF (ADMIN-R) to ensure that gatewayed DAQ is representative of the DAQ on each talkgroup/frequency if tested individually.
- c. Contractor/Designer shall work through the JMU PM to provide electronic and hard copies of the Building Plan with Grid Overlay Test Recording Sheets to JMU ITT, JMUPD, AHJ, and VSFM at least 48 hours before the scheduled ATP.
- d. Building Plan with Grid Overlay Test Recording Sheets shall preferably be formatted and printed on 8.5" x 11" paper sheets as a representation of the corresponding floor plan to include assigned room numbers on the floorplan layer with font and lines printed in medium (50%) GREY.
- e. Multiple sheets per structure level/section are acceptable if the structures size requires blow-up views to be able to clearly record ATP results.
- f. Grid blocks (representing grid tested spaces sized 20' x 20' for confined individual office or academic spaces or 50' x 50' for general use open air arenas and parking structures or other pre-approved grid size) on the Test Scoring Sheets should be no smaller than ½" x ½" square and consist of outlines and font printed in RED for grid blocks that encompass any Designated Critical Coverage Areas and BLUE for all other grid blocks that encompass General Coverage Areas.
- g. Grid blocks shall be numbered sequentially starting in the upper left corner of the sheet and increasing from Left to Right across the rows, and from Top to Bottom as rows continue down the grid overlay on the page.
- h. Each DAS GRID TEST LOG SHEET will need a Header to include:
Building Name; Floor Represented; Grid Numbers Included on this Particular Page; Blank for Evaluators Name; Blank for Evaluators Location & Method (i.e. - On-site 800 Mhz, On-Site UHF, Remote 800 Mhz, Remote UHF, JMUPD Console 800, JMU Stadium Console UHF, etc.) Blank for Date Test Performed.
- i. Each Evaluator will use the following format to transmit audio starting with the On-Site 800 Evaluator:
 1. "ON-SITE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 2. "ON-SITE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 3. "REMOTE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"

4. "REMOTE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
5. "CONSOLE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
6. "CONSOLE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"

- j. Each evaluator will record their overall perceived DAQ quality test results in the specified grid block on their copy of the DAS GRID TEST LOG SHEET which corresponds to the grids on the Building Plan with Grid Overlay in the following format DAQ: 3.4 or 4.0; RSSI -dBm Mhz Signal Strength 82 or 95, 121, etc.).
- k. Any unusual call quality issues other than the prescribed DAQ / RSSI shall be thoroughly documented and reported to JMU PM, JMU ITT and the AHJ with a complete description of the symptoms, test conditions and include any recommended remedial actions that could or should be taken to resolve the issue.
- l. JMU ITT and the AHJ may allow alternative testing using RSSI and DAQ results from test TX/RX individually on designated 800 Mhz Talkgroups and UHF 450 frequencies or through established system gateways that will link specific frequencies and talkgroups and recorded in JMU ITT's PCTel SeaGull IBflex RF DAS Testing Unit.

State Offeror's acknowledgement of these acceptance and testing requirements.

6. Documentation

- a. Provide a detailed materials list and inventory of all installed equipment to include: Manufacturer; Model; Serial Number; Installation Date; Physical Address of all equipment to include Room Number or Descriptive Location on within the Interior or on the Exterior of Structure; Specify RX & TX Frequencies tuned to boost. Materials list should also include: JMU Building Name; 911 Street Address, Installing Vendor/Representative Name, Address and Contact Info; Maintenance/Warranty Vendor Name, Address and Contact info.
- b. Provide labelled digital images of all: Radio Repeaters; Signal Boosters; Different Antenna Types Deployed Internally and Externally; Equipment Cabinets; Roof Penetrations; Equipment Supporting Battery or UPS Hardware and Equipment Ground Connections.
- c. Provide comprehensive As-Built Diagrams in MS Visio or another approved format. Should also be included in IBCW/IBX floorplan files provided to JMU ITT when Commissioning and Acceptance Testing is performed.
- d. Provide electronic and hard copies of the Building Plans to included DAS Hardware Designations and Locations WITH and WITHOUT acceptable Grid Overlay in both IBCW/IBX and PDF File formats Testing and Recording to JMU ITT as specified in the Commissioning & Acceptance Testing Procedures Section of this policy at least 48 working hours prior to any type of Inspection or Testing.
- e. Provide supporting Spectrum Analyzer Graph and Report Print Outs from all tests and final inspections performed in electronic PDF format to demonstrate design progression and final as-delivered levels. Signal Strength Propagation coverage maps

(i.e. - Heat Maps) shall be kept on file with JMU ITT RF Documentation from original acceptance of the installed system. These may be used for future comparison in the event of signal degradation, system failure, or future system refresh to compare differences or similarities.

- f. Provide all design propagation maps in electronic PDF format during design and testing phases of the project and shall be kept on file with JMU ITT RF Documentation. These may be pulled out and compared to current RSSI signal strength conditions to see if something has degraded or changed to compare difference or similarities.
- g. Final acceptance will be granted once all public safety authorities (JMU & Local AHJ) approve the performance of the DAS for public safety, first responders, daily users, and JMU accepts the DAS for use with their radio system, all punch list items have been completed and all documentation has been submitted and approved by JMU IT Telecom.

State Offeror's acknowledgement of these documentation requirements.

7. Warranty

Costs associated with base warranty and options shall be itemized and included in the pricing section of any design proposals for DAS installations at JMU.

- a. **Acknowledge Offeror's ability to provide the following or suggest alternative. Indicate costs in *Pricing Schedule Section X*.**
 - 1. All labor and equipment furnished, including hardware and software components, shall be fully warranted to be free from defects in material and workmanship for a period of one (1) year from the date of final acceptance.
 - 2. Provide optional annual costs for an extended equipment and software warranty for years two through five.
 - 3. Provide an extended prepaid warranty option covering five years of warranty.
- b. All preventive maintenance necessary for the system and its components shall be performed during the warranty period. This maintenance shall be limited to the hardware, software and firmware furnished by the Contractor.

State Offeror's acknowledgement of these warranty requirements.

8. Maintenance

The university has PS DAS installed in twenty buildings across campus, see *Attachment H*. The university may enter into a maintenance agreement for these existing systems and any system(s) purchased under this contract that moves beyond warranty.

JMU expects such maintenance to be performed at regularly scheduled intervals in accordance with the recommendations of the manufacturer at a minimum. Offeror shall perform the agreed-upon preventive maintenance once annually during the original warranty period, during the entire life of any active extended maintenance contract with that contractor, or as often as recommended by the manufacturer in accordance with

[REF: NFPA 1221, 11.3.9], whichever is more stringent.

Any potential costs associated with this type of support or service that will be the responsibility of JMU shall be clearly and individually identified in the pricing section of any proposals to provide DAS related Hardware or Services.

State Offeror's ability and willingness to support the installed systems found on Attachment H.

- a. Provide a detailed description(s) of Offeror's maintenance plan(s) /options. **Ensure that the costs of the plan(s) are easily identifiable in Pricing Schedule Section X. Identify whether materials are included in the plan costs.**
 1. Indicate how maintenance costs are calculated for adding systems/locations to the plan and timing for making those adjustments to the plan.
- b. Include a schedule of maintenance tasks to be performed under each option. JMU has identified that at a minimum the plan should include the following tasks.
 1. Review any reports of degraded service since last test.
 2. Resolve nuisance malfunctions and/or failures. These are recurring operational or functional problems that prevent systems and/or equipment from providing the degree of reliability and services specified at the time of procurement or usefulness necessary for JMU operations, or cause JMU to assign significant resources to resolve on three or more occasions, on similar models of equipment. Such problems can be caused by software, firmware or hardware that is faulty or improperly designed, engineered, manufactured, installed or configured. It does not include degraded operation, which could be resolved through additional optimization within the term of the initial contract.
 3. Inspect all infrastructure hardware for signs of damage or malfunctions.
 4. Inspect all external antennas, cabling and grounds for signs of weathering, deterioration, or damage.
 5. Test all UPS batteries to ensure that they hold for prescribed durations, replace as necessary.
 6. Perform local and/or remote manufacturer-recommended software and firmware updates.
 7. Conduct RSSI – Radio Signal Strength Indicator Testing either with a portable radio or spectrum analyzer in all areas listed as Critical Coverage Areas documenting current RSSI levels and all test locations.
 8. Perform spot testing throughout at least 25% of the remainder of the General Coverage Areas of the structure documenting current RSSI levels and all test locations.
 9. Conduct Full Grid RSSI level testing on any areas of the structure that may have been modified or had significant changes in usage or equipment present since last Maintenance/Warranty Test was conducted.

10. Compare the results of current testing with RSSI documentation from original acceptance testing and last maintenance/warranty testing and/or any JMU ITT PCTel SeaGull IBflex RF DAS Testing Documentation to identify any discrepancies or variations in coverage.
 11. Use results of testing to identify any areas that need hardware tuning, repair, or upgrades to meet required standards of coverage.
 12. Document any tuning, repairs, modifications or replacements to the system conducted as a result of this test.
 13. Submit all documentation to JMU ITT for DAS System Archive file.
- c. Provide a letter of certification from the manufacturer(s) authenticating the Offeror's and Offeror's subcontractor's qualifications for warranty and maintenance services of systems noted in *Attachment H* and for any solutions proposed under this contract.
 - d. Define and provide Offeror's proposed service level agreement for providing emergency services to JMU. Define what constitutes an emergency. Include escalation procedures and contact information.
 - e. State Offeror's plan for ensuring technician certifications are kept up to date with changing technology and JMU's evolving environment.
 - f. The swift restoration of service is paramount to business continuity. Often that depends on replacing parts or dispatching personnel.
 1. List the location(s) of the nearest service center(s) having qualified technicians and containing repair parts for the JMU systems under contract.
 2. Describe the parts in stock in the local warehouse and available to JMU.
 3. Indicate those parts and quantities recommended to be stocked on campus as well as those to be stocked in the warehouse.
 4. If a required part is not immediately available on site or in the local warehouse, describe the approach for providing the part to JMU.
 - h. Describe Offeror's standard policy and any options available for covering lightening damaged equipment.
 - i. JMU requires annual performance testing and benchmarking against acceptance testing results for existing systems and for all new systems procured under this contract.
 1. Describe your method for performing, documenting and providing test results. Include brand name of test equipment and identify the formats for presenting test results i.e. MS Word, PDF, MS Excel, etc.
 - j. Indicate for each existing or proposed PS DAS system/solution the availability of training for JMU personnel. Describe available training methods and state specific training locations. **State associated costs in Section X. Pricing Schedule.**

- k. **In *Pricing Schedule* Section X, provide Time and Material (Will Call) pricing for providing services not covered under warranty or maintenance. Include all costs the university should expect to incur.**

State Offeror's acknowledgement of these maintenance requirements.

C. Other Services

Describe in detail any other products or services you are authorized to provide to JMU. Indicate whether these products/services are provided in-house or through third party partners. Provide manufacturer/provider letters of authorization. **Detail pricing in Section X. *Pricing Schedule*.**

V. PROPOSAL PREPARATION AND SUBMISSION

A. GENERAL INSTRUCTIONS

To ensure timely and adequate consideration of your proposal, offerors are to limit all contact, whether verbal or written, pertaining to this RFP to the James Madison University Procurement Office for the duration of this Proposal process. Failure to do so may jeopardize further consideration of Offeror's proposal.

ELECTRONIC OR PAPER SUBMISSIONS MAY BE ACCEPTED FOR THIS PROPOSAL. INSTRUCTIONS BELOW FOR OFFEROR'S CHOSEN METHOD (A. ELECTRONIC SUBMISSION or B. PAPER RESPONSE).

1. RFP Response: In order to be considered for selection, the **Offeror shall submit a complete response to this RFP**; and shall submit to the issuing Purchasing Agency:

a. **ELECTRONIC SUBMISSION:**

- i. **ELECTRONIC RESPONSES SUBMITTED THROUGH eVA WILL BE ACCEPTED. Emailed responses will not be accepted.** Please see below, "eVA Procurement Website and Registration" for additional information on registration. It is the responsibility of the Supplier to ensure their proposal and all required documentation is properly completed, readable, and uploaded to eVA. Suppliers should allow sufficient time to account for any technical difficulties they may encounter during online submission or uploading of the documents. In the event of any technical difficulties, Suppliers shall contact the eVA Customer Care Center at 1-866-289-7367 or via email at eVACustomerCare@DGS.virginia.gov.
- ii. eVA Procurement Website and Registration The Commonwealth's procurement portal, eVA, located at <http://www.eva.virginia.gov>, provides information about Commonwealth solicitations and awards. Suppliers shall be registered in eVA in order submit a proposal to this RFP. To register with eVA, select "Register Now" on the eVA website homepage, <http://www.eva.virginia.gov>. For registration instructions and assistance, as well as instructions on how to submit proposals and accept orders please select "I Sell to Virginia". Suppliers are encouraged to check this site on a regular

basis and, in particular, prior to submission of proposals to identify any amendments to the RFP that may have been issued.

- iii. Electronic Responses submitted through eVA shall be in WORD format or searchable PDF of the entire proposal, INCLUDING ALL ATTACHMENTS. PDFs must be submitted in an unlocked format. Any proprietary information should be clearly marked in accordance with Section V.4.f. below.

b. PAPER SUBMISSIONS:

- i. **One (1) original and one (1) copy** of the entire proposal, INCLUDING ALL ATTACHMENTS. Any proprietary information should be clearly marked in accordance with V.4.e. below.
 - ii. **One (1) electronic copy in WORD format or searchable PDF (CD or flash drive)** of the entire proposal, INCLUDING ALL ATTACHMENTS. Any proprietary information should be clearly marked in accordance with Section V.4.f. below.
 - iii. Each copy of the proposal should be bound or contained in a single volume where practical. All documentation submitted with the proposal should be contained in that single volume.
 - iv. See additional information in Section VIII.C, *IDENIFICATION OF PROPSAL ENVELOPE*.
2. Should the proposal contain **proprietary information, provide one (1) redacted copy of the proposal** and all attachments with **proprietary portions removed or blacked out**. This copy should be clearly marked “*Redacted Copy*” on the front cover. The classification of an entire proposal document, line-item prices, and/or total proposal prices as proprietary or trade secrets is not acceptable. JMU shall not be responsible for the Contractor’s failure to exclude proprietary information from this redacted copy.

No other distribution of the proposal shall be made by the Offeror.

3. The version of the solicitation issued by JMU Procurement Services, as amended by an addenda, is the mandatory controlling version of the document. Any modification of, or additions to, the solicitation by the Offeror shall not modify the official version of the solicitation issued by JMU Procurement services unless accepted in writing by the University. Such modifications or additions to the solicitation by the Offeror may be cause for rejection of the proposal; however, JMU reserves the right to decide, on a case-by-case basis in its sole discretion, whether to reject such a proposal. If the modification or additions are not identified until after the award of the contract, the controlling version of the solicitation document shall still be the official state form issued by Procurement Services.
4. Proposal Preparation
- a. Proposals shall be signed by an authorized representative of the Offeror. All information requested should be submitted. Failure to submit all information requested may result in the purchasing agency requiring prompt submissions of missing information and/or giving a lowered evaluation of the proposal. Proposals which are substantially incomplete or lack key information may be rejected by the purchasing

agency. Mandatory requirements are those required by law or regulation or are such that they cannot be waived and are not subject to negotiation.

- b. Proposals shall be prepared simply and economically, providing a straightforward, concise description of capabilities to satisfy the requirements of the RFP. Emphasis should be placed on completeness and clarity of content.
- c. Proposals should be organized in the order in which the requirements are presented in the RFP. All pages of the proposal should be numbered. Each paragraph in the proposal should reference the paragraph number of the corresponding section of the RFP. It is also helpful to cite the paragraph number, sub letter, and repeat the text of the requirement as it appears in the RFP. If a response covers more than one page, the paragraph number and sub letter should be repeated at the top of the next page. The proposal should contain a table of contents which cross references the RFP requirements. Information which the offeror desires to present that does not fall within any of the requirements of the RFP should be inserted at the appropriate place or be attached at the end of the proposal and designated as additional material. Proposals that are not organized in this manner risk elimination from consideration if the evaluators are unable to find where the RFP requirements are specifically addressed.
- d. As used in this RFP, the terms “must”, “shall”, “should” and “may” identify the criticality of requirements. “Must” and “shall” identify requirements whose absence will have a major negative impact on the suitability of the proposed solution. Items labeled as “should” or “may” are highly desirable, although their absence will not have a large impact and would be useful, but are not necessary. Depending on the overall response to the RFP, some individual “must” and “shall” items may not be fully satisfied, but it is the intent to satisfy most, if not all, “must” and “shall” requirements. The inability of an offeror to satisfy a “must” or “shall” requirement does not automatically remove that offeror from consideration; however, it may seriously affect the overall rating of the offeror’s proposal.
- e. Each copy of the proposal should be bound or contained in a single volume where practical. All documentation submitted with the proposal should be contained in that single volume.
- f. Ownership of all data, materials and documentation originated and prepared for the State pursuant to the RFP shall belong exclusively to the State and be subject to public inspection in accordance with the Virginia Freedom of Information Act. Trade secrets or proprietary information submitted by the offeror shall not be subject to public disclosure under the Virginia Freedom of Information Act; however, the offeror must invoke the protection of Section 2.2-4342F of the Code of Virginia, in writing, either before or at the time the data is submitted. **The written notice must specifically identify the data or materials to be protected and state the reasons why protection is necessary. The proprietary or trade secret materials submitted must be identified by some distinct method such as highlighting or underlining and must indicate only the specific words, figures, or paragraphs that constitute trade secret or proprietary information. The classification of an entire proposal document, line-item prices and/or total proposal prices as proprietary or trade secrets is not acceptable. Marking an entire proposal as confidential or attempts to prevent disclosure of pricing information by designating it as confidential, proprietary or trade secret will be ignored.**

5. Oral Presentation: Offerors who submit a proposal in response to this RFP may be required to give an oral presentation of their proposal to James Madison University. This provides an opportunity for the Offeror to clarify or elaborate on the proposal. This is a fact-finding and explanation session only and does not include negotiation. James Madison University will schedule the time and location of these presentations. Oral presentations are an option of the University and may or may not be conducted. Therefore, proposals should be complete.

B. SPECIFIC PROPOSAL INSTRUCTIONS

Proposals should be as thorough and detailed as possible so that James Madison University may properly evaluate your capabilities to provide the required services. Offerors are required to submit the following items as a complete proposal:

1. Return RFP cover sheet and all addenda acknowledgements, if any, signed and filled out as required. (Electronic signature shall be accepted, i.e. Adobe Sign, DocuSign, etc.)
2. Plan and methodology for providing the goods/services as described in Section IV. Statement of Needs of this Request for Proposal.
3. A written narrative statement to include, but not be limited to, the expertise, qualifications, and experience of the firm and resumes of specific personnel to be assigned to perform the work.
4. Offeror Data Sheet, included as *Attachment A* to this RFP.
5. Small Business Subcontracting Plan, included as *Attachment B* to this RFP. Offeror shall provide a Small Business Subcontracting plan which summarizes the planned utilization of Department of Small Business and Supplier Diversity (SBSD)-certified small businesses which include businesses owned by women and minorities, when they have received Department of Small Business and Supplier Diversity (SBSD) small business certification, under the contract to be awarded as a result of this solicitation. This is a requirement for all prime contracts in excess of \$100,000 unless no subcontracting opportunities exist.
6. Identify the amount of sales your company had during the last twelve months with each VASCUPP Member Institution. A list of VASCUPP Members can be found at: www.VASCUPP.org.
7. Proposed Cost. See Section X. *Pricing Schedule* of this Request for Proposal.

VI. EVALUATION AND AWARD CRITERIA

A. EVALUATION CRITERIA

Proposals shall be evaluated by James Madison University using the following criteria:

	<u>Points</u>
1. Quality of products/services offered and suitability for intended purposes	25
2. Qualifications and experience of Offeror in providing the goods/services	20

3. Specific plans or methodology to be used to perform the services	30
4. Participation of Small, Women-Owned, & Minority (SWaM) Businesses	10
5. Cost	15
	100

- B. AWARD TO MULTIPLE OFFERORS: Selection shall be made of two or more offerors deemed to be fully qualified and best suited among those submitting proposals on the basis of the evaluation factors included in the Request for Proposals, including price, if so stated in the Request for Proposals. Negotiations shall be conducted with the offerors so selected. Price shall be considered but need not be the sole determining factor. After negotiations have been conducted with each offeror so selected, the agency shall select the offeror which, in its opinion, has made the best proposal, and shall award the contract to that offeror. The Commonwealth reserves the right to make multiple awards as a result of this solicitation. The Commonwealth may cancel this Request for Proposals or reject proposals at any time prior to an award and is not required to furnish a statement of the reasons why a particular proposal was not deemed to be the most advantageous. Should the Commonwealth determine in writing and in its sole discretion that only one offeror is fully qualified, or that one offeror is clearly more highly qualified than the others under consideration, a contract may be negotiated and awarded to that offeror. The award document will be a contract incorporating by reference all the requirements, terms and conditions of the solicitation and the contractor's proposal as negotiated.

II. GENERAL TERMS AND CONDITIONS

- A. PURCHASING MANUAL: This solicitation is subject to the provisions of the Commonwealth of Virginia's Purchasing Manual for Institutions of Higher Education and Their Vendors and any revisions thereto, which are hereby incorporated into this contract in their entirety. A copy of the manual is available for review at the purchasing office. In addition, the manual may be accessed electronically at <http://www.jmu.edu/procurement> or a copy can be obtained by calling Procurement Services at (540) 568-3145.
- B. APPLICABLE LAWS AND COURTS: This solicitation and any resulting contract shall be governed in all respects by the laws of the Commonwealth of Virginia and any litigation with respect thereto shall be brought in the courts of the Commonwealth. The Contractor shall comply with applicable federal, state and local laws and regulations.
- C. ANTI-DISCRIMINATION: By submitting their proposals, offerors certify to the Commonwealth that they will conform to the provisions of the Federal Civil Rights Act of 1964, as amended, as well as the Virginia Fair Employment Contracting Act of 1975, as amended, where applicable, the Virginians With Disabilities Act, the Americans With Disabilities Act and §10 of the Rules Governing Procurement, Chapter 2, Exhibit J, Attachment 1 (available for review at <http://www.jmu.edu/procurement>). If the award is made to a faith-based organization, the organization shall not discriminate against any recipient of goods, services, or disbursements made pursuant to the contract on the basis of the recipient's religion, religious belief, refusal to participate in a religious practice, or on the basis of race, age, color, gender, sexual orientation, gender identity, or national origin and shall be subject to the same rules as other organizations that contract with public bodies to account for the use of the funds provided; however, if the faith-based organization segregates public funds into separate accounts, only the accounts and programs funded with public funds shall be subject to audit by the public body. (*§6 of the Rules Governing Procurement*).

In every contract over \$10,000 the provisions in 1. and 2. below apply:

1. During the performance of this contract, the contractor agrees as follows:
 - a. The contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is a bona fide occupational qualification reasonably necessary to the normal operation of the contractor. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.
 - b. The contractor, in all solicitations or advertisements for employees placed by or on behalf of the contractor, will state that such contractor is an equal opportunity employer.
 - c. Notices, advertisements, and solicitations placed in accordance with federal law, rule, or regulation shall be deemed sufficient for the purpose of meeting these requirements.
 2. The contractor will include the provisions of 1. above in every subcontract or purchase order over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.
- D. ETHICS IN PUBLIC CONTRACTING: By submitting their proposals, offerors certify that their proposals are made without collusion or fraud and that they have not offered or received any kickbacks or inducements from any other offeror, supplier, manufacturer or subcontractor in connection with their proposal, and that they have not conferred on any public employee having official responsibility for this procurement transaction any payment, loan, subscription, advance, deposit of money, services or anything of more than nominal value, present or promised, unless consideration of substantially equal or greater value was exchanged.
- E. IMMIGRATION REFORM AND CONTROL ACT OF 1986: By entering into a written contract with the Commonwealth of Virginia, the Contractor certifies that the Contractor does not, and shall not during the performance of the contract for goods and services in the Commonwealth, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.
- F. DEBARMENT STATUS: By submitting their proposals, offerors certify that they are not currently debarred by the Commonwealth of Virginia from submitting proposals on contracts for the type of goods and/or services covered by this solicitation, nor are they an agent of any person or entity that is currently so debarred.
- G. ANTITRUST: By entering into a contract, the contractor conveys, sells, assigns, and transfers to the Commonwealth of Virginia all rights, title and interest in and to all causes of action it may now have or hereafter acquire under the antitrust laws of the United States and the Commonwealth of Virginia, relating to the particular goods or services purchased or acquired by the Commonwealth of Virginia under said contract.
- H. MANDATORY USE OF STATE FORM AND TERMS AND CONDITIONS RFPs: Failure to submit a proposal on the official state form provided for that purpose may be a cause for rejection of the proposal. Modification of or additions to the General Terms and Conditions of the solicitation may be cause for rejection of the proposal; however, the Commonwealth

reserves the right to decide, on a case by case basis, in its sole discretion, whether to reject such a proposal.

- I. CLARIFICATION OF TERMS: If any prospective offeror has questions about the specifications or other solicitation documents, the prospective offeror should contact the buyer whose name appears on the face of the solicitation no later than five working days before the due date. Any revisions to the solicitation will be made only by addendum issued by the buyer.

J. PAYMENT:

1. To Prime Contractor:

- a. Invoices for items ordered, delivered and accepted shall be submitted by the contractor directly to the payment address shown on the purchase order/contract. All invoices shall show the state contract number and/or purchase order number; social security number (for individual contractors) or the federal employer identification number (for proprietorships, partnerships, and corporations).
- b. Any payment terms requiring payment in less than 30 days will be regarded as requiring payment 30 days after invoice or delivery, whichever occurs last. This shall not affect offers of discounts for payment in less than 30 days, however.
- c. All goods or services provided under this contract or purchase order, that are to be paid for with public funds, shall be billed by the contractor at the contract price, regardless of which public agency is being billed.
- d. The following shall be deemed to be the date of payment: the date of postmark in all cases where payment is made by mail, or the date of offset when offset proceedings have been instituted as authorized under the Virginia Debt Collection Act.
- e. Unreasonable Charges. Under certain emergency procurements and for most time and material purchases, final job costs cannot be accurately determined at the time orders are placed. In such cases, contractors should be put on notice that final payment in full is contingent on a determination of reasonableness with respect to all invoiced charges. Charges which appear to be unreasonable will be researched and challenged, and that portion of the invoice held in abeyance until a settlement can be reached. Upon determining that invoiced charges are not reasonable, the Commonwealth shall promptly notify the contractor, in writing, as to those charges which it considers unreasonable and the basis for the determination. A contractor may not institute legal action unless a settlement cannot be reached within thirty (30) days of notification. The provisions of this section do not relieve an agency of its prompt payment obligations with respect to those charges which are not in dispute (*Rules Governing Procurement, Chapter 2, Exhibit J, Attachment 1 § 53; available for review at <http://www.jmu.edu/procurement>*).

2. To Subcontractors:

- a. A contractor awarded a contract under this solicitation is hereby obligated:

- (1) To pay the subcontractor(s) within seven (7) days of the contractor's receipt of payment from the Commonwealth for the proportionate share of the payment received for work performed by the subcontractor(s) under the contract; or
 - (2) To notify the agency and the subcontractors, in writing, of the contractor's intention to withhold payment and the reason.
- b. The contractor is obligated to pay the subcontractor(s) interest at the rate of one percent per month (unless otherwise provided under the terms of the contract) on all amounts owed by the contractor that remain unpaid seven (7) days following receipt of payment from the Commonwealth, except for amounts withheld as stated in (2) above. The date of mailing of any payment by U. S. Mail is deemed to be payment to the addressee. These provisions apply to each sub-tier contractor performing under the primary contract. A contractor's obligation to pay an interest charge to a subcontractor may not be construed to be an obligation of the Commonwealth.
3. Each prime contractor who wins an award in which provision of a SWAM procurement plan is a condition to the award, shall deliver to the contracting agency or institution, on or before request for final payment, evidence and certification of compliance (subject only to insubstantial shortfalls and to shortfalls arising from subcontractor default) with the SWAM procurement plan. Final payment under the contract in question may be withheld until such certification is delivered and, if necessary, confirmed by the agency or institution, or other appropriate penalties may be assessed in lieu of withholding such payment.
 4. The Commonwealth of Virginia encourages contractors and subcontractors to accept electronic and credit card payments.
- K. PRECEDENCE OF TERMS: Paragraphs A through J of these General Terms and Conditions and the Commonwealth of Virginia Purchasing Manual for Institutions of Higher Education and their Vendors, shall apply in all instances. In the event there is a conflict between any of the other General Terms and Conditions and any Special Terms and Conditions in this solicitation, the Special Terms and Conditions shall apply.
- L. QUALIFICATIONS OF OFFERORS: The Commonwealth may make such reasonable investigations as deemed proper and necessary to determine the ability of the offeror to perform the services/furnish the goods and the offeror shall furnish to the Commonwealth all such information and data for this purpose as may be requested. The Commonwealth reserves the right to inspect offeror's physical facilities prior to award to satisfy questions regarding the offeror's capabilities. The Commonwealth further reserves the right to reject any proposal if the evidence submitted by, or investigations of, such offeror fails to satisfy the Commonwealth that such offeror is properly qualified to carry out the obligations of the contract and to provide the services and/or furnish the goods contemplated therein.
- M. TESTING AND INSPECTION: The Commonwealth reserves the right to conduct any test/inspection it may deem advisable to assure goods and services conform to the specifications.
- N. ASSIGNMENT OF CONTRACT: A contract shall not be assignable by the contractor in whole or in part without the written consent of the Commonwealth.
- O. CHANGES TO THE CONTRACT: Changes can be made to the contract in any of the following ways:

1. The parties may agree in writing to modify the scope of the contract. An increase or decrease in the price of the contract resulting from such modification shall be agreed to by the parties as a part of their written agreement to modify the scope of the contract.
 2. The Purchasing Agency may order changes within the general scope of the contract at any time by written notice to the contractor. Changes within the scope of the contract include, but are not limited to, things such as services to be performed, the method of packing or shipment, and the place of delivery or installation. The contractor shall comply with the notice upon receipt. The contractor shall be compensated for any additional costs incurred as the result of such order and shall give the Purchasing Agency a credit for any savings. Said compensation shall be determined by one of the following methods:
 - a. By mutual agreement between the parties in writing; or
 - b. By agreeing upon a unit price or using a unit price set forth in the contract, if the work to be done can be expressed in units, and the contractor accounts for the number of units of work performed, subject to the Purchasing Agency's right to audit the contractor's records and/or to determine the correct number of units independently; or
 - c. By ordering the contractor to proceed with the work and keep a record of all costs incurred and savings realized. A markup for overhead and profit may be allowed if provided by the contract. The same markup shall be used for determining a decrease in price as the result of savings realized. The contractor shall present the Purchasing Agency with all vouchers and records of expenses incurred and savings realized. The Purchasing Agency shall have the right to audit the records of the contractor as it deems necessary to determine costs or savings. Any claim for an adjustment in price under this provision must be asserted by written notice to the Purchasing Agency within thirty (30) days from the date of receipt of the written order from the Purchasing Agency. If the parties fail to agree on an amount of adjustment, the question of an increase or decrease in the contract price or time for performance shall be resolved in accordance with the procedures for resolving disputes provided by the Disputes Clause of this contract or, if there is none, in accordance with the disputes provisions of the Commonwealth of Virginia Purchasing Manual for Institutions of Higher Education and their Vendors. Neither the existence of a claim nor a dispute resolution process, litigation or any other provision of this contract shall excuse the contractor from promptly complying with the changes ordered by the Purchasing Agency or with the performance of the contract generally.
- P. DEFAULT: In case of failure to deliver goods or services in accordance with the contract terms and conditions, the Commonwealth, after due oral or written notice, may procure them from other sources and hold the contractor responsible for any resulting additional purchase and administrative costs. This remedy shall be in addition to any other remedies which the Commonwealth may have.
- Q. INSURANCE: By signing and submitting a proposal under this solicitation, the offeror certifies that if awarded the contract, it will have the following insurance coverage at the time the contract is awarded. For construction contracts, if any subcontractors are involved, the subcontractor will have workers' compensation insurance in accordance with § 25 of the Rules Governing Procurement – Chapter 2, Exhibit J, Attachment 1, and 65.2-800 et. Seq. of the Code of Virginia (available for review at <http://www.jmu.edu/procurement>) The offeror further certifies that the contractor and any subcontractors will maintain these insurance coverage during the entire term of the contract and that all insurance coverage will be provided

by insurance companies authorized to sell insurance in Virginia by the Virginia State Corporation Commission.

MINIMUM INSURANCE COVERAGES AND LIMITS REQUIRED FOR MOST CONTRACTS:

1. Workers' Compensation: Statutory requirements and benefits. Coverage is compulsory for employers of three or more employees, to include the employer. Contractors who fail to notify the Commonwealth of increases in the number of employees that change their workers' compensation requirement under the Code of Virginia during the course of the contract shall be in noncompliance with the contract.
 2. Employer's Liability: \$100,000
 3. Commercial General Liability: \$1,000,000 per occurrence and \$2,000,000 in the aggregate. Commercial General Liability is to include bodily injury and property damage, personal injury and advertising injury, products and completed operations coverage. The Commonwealth of Virginia must be named as an additional insured and so endorsed on the policy.
 4. Automobile Liability: \$1,000,000 combined single limit. *(Required only if a motor vehicle not owned by the Commonwealth is to be used in the contract. Contractor must assure that the required coverage is maintained by the Contractor (or third party owner of such motor vehicle.)*
- R. ANNOUNCEMENT OF AWARD: Upon the award or the announcement of the decision to award a contract over \$100,000, as a result of this solicitation, the purchasing agency will publicly post such notice on the DGS/DPS eVA web site (www.eva.virginia.gov) for a minimum of 10 days.
- S. DRUG-FREE WORKPLACE: During the performance of this contract, the contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the contractor that the contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over \$10,000, so that the provisions will be binding upon each subcontractor or vendor.
- For the purposes of this section, "drug-free workplace" means a site for the performance of work done in connection with a specific contract awarded to a contractor, the employees of whom are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the contract.
- T. NONDISCRIMINATION OF CONTRACTORS: An offeror, or contractor shall not be discriminated against in the solicitation or award of this contract because of race, religion, color, sex, sexual orientation, gender identity, national origin, age, disability, faith-based organizational status, any other basis prohibited by state law relating to discrimination in employment or because the offeror employs ex-offenders unless the state agency, department or institution has made a written determination that employing ex-offenders on the specific

contract is not in its best interest. If the award of this contract is made to a faith-based organization and an individual, who applies for or receives goods, services, or disbursements provided pursuant to this contract objects to the religious character of the faith-based organization from which the individual receives or would receive the goods, services, or disbursements, the public body shall offer the individual, within a reasonable period of time after the date of his objection, access to equivalent goods, services, or disbursements from an alternative provider.

- U. eVA BUSINESS TO GOVERNMENT VENDOR REGISTRATION, CONTRACTS, AND ORDERS: The eVA Internet electronic procurement solution, website portal www.eVA.virginia.gov, streamlines and automates government purchasing activities in the Commonwealth. The eVA portal is the gateway for vendors to conduct business with state agencies and public bodies. All vendors desiring to provide goods and/or services to the Commonwealth shall participate in the eVA Internet eprocurement solution by completing the free eVA Vendor Registration. All offerors must register in eVA and pay the Vendor Transaction Fees specified below; failure to register will result in the proposal being rejected. Vendor transaction fees are determined by the date the original purchase order is issued and the current fees are as follows:

Vendor transaction fees are determined by the date the original purchase order is issued and the current fees are as follows:

1. For orders issued July 1, 2014 and after, the Vendor Transaction Fee is:
 - a. Department of Small Business and Supplier Diversity (SBSD) certified Small Businesses: 1% capped at \$500 per order.
 - b. Businesses that are not Department of Small Business and Supplier Diversity (SBSD) certified Small Businesses: 1% capped at \$1,500 per order.
2. For orders issued prior to July 1, 2014, the vendor transaction fees can be found at www.eVA.virginia.gov.
3. The specified vendor transaction fee will be invoiced by the Commonwealth of Virginia Department of General Services approximately 60 days after the corresponding purchase order is issued and payable 30 days after the invoice date. Any adjustments (increases/decreases) will be handled through purchase order changes.

- V. AVAILABILITY OF FUNDS: It is understood and agreed between the parties herein that the Commonwealth of Virginia shall be bound hereunder only to the extent of the funds available or which may hereafter become available for the purpose of this agreement.

- W. PRICING CURRENCY: Unless stated otherwise in the solicitation, offerors shall state offered prices in U.S. dollars.

- X. E-VERIFY REQUIREMENT OF ANY CONTRACTOR: Any employer with more than an average of 50 employees for the previous 12 months entering into a contract in excess of \$50,000 with James Madison University to perform work or provide services pursuant to such contract shall register and participate in the E-Verify program to verify information and work authorization of its newly hired employees performing work pursuant to any awarded contract.

- Y. CIVILITY IN STATE WORKPLACES: The contractor shall take all reasonable steps to ensure that no individual, while performing work on behalf of the contractor or any subcontractor in

connection with this agreement (each, a “Contract Worker”), shall engage in 1) harassment (including sexual harassment), bullying, cyber-bullying, or threatening or violent conduct, or 2) discriminatory behavior on the basis of race, sex, color, national origin, religious belief, sexual orientation, gender identity or expression, age, political affiliation, veteran status, or disability.

The contractor shall provide each Contract Worker with a copy of this Section and will require Contract Workers to participate in training on civility in the State workplace. Upon request, the contractor shall provide documentation that each Contract Worker has received such training.

For purposes of this Section, “State workplace” includes any location, permanent or temporary, where a Commonwealth employee performs any work-related duty or is representing his or her agency, as well as surrounding perimeters, parking lots, outside meeting locations, and means of travel to and from these locations. Communications are deemed to occur in a State workplace if the Contract Worker reasonably should know that the phone number, email, or other method of communication is associated with a State workplace or is associated with a person who is a State employee.

The Commonwealth of Virginia may require, at its sole discretion, the removal and replacement of any Contract Worker who the Commonwealth reasonably believes to have violated this Section.

This Section creates obligations solely on the part of the contractor. Employees or other third parties may benefit incidentally from this Section and from training materials or other communications distributed on this topic, but the Parties to this agreement intend this Section to be enforceable solely by the Commonwealth and not by employees or other third parties.

III. SPECIAL TERMS AND CONDITIONS

- A. AUDIT: The contractor shall retain all books, records, and other documents relative to this contract for five (5) years after final payment, or until audited by the Commonwealth of Virginia, whichever is sooner. The agency, its authorized agents, and/or state auditors shall have full access to and the right to examine any of said materials during said period.
- B. CANCELLATION OF CONTRACT: James Madison University reserves the right to cancel and terminate any resulting contract, in part or in whole, without penalty, upon 60 days written notice to the contractor. In the event the initial contract period is for more than 12 months, the resulting contract may be terminated by either party, without penalty, after the initial 12 months of the contract period upon 60 days written notice to the other party. Any contract cancellation notice shall not relieve the contractor of the obligation to deliver and/or perform on all outstanding orders issued prior to the effective date of cancellation.
- C. IDENTIFICATION OF PROPOSAL ENVELOPE: If a special envelope is not furnished, or if return in the special envelope is not possible, the signed proposal should be returned in a separate envelope or package, sealed and identified as follows:

From: _____
Name of Offeror Due Date Time

Street or Box Number

RFP No.

City, State, Zip Code

RFP Title

Name of Buyer _____

The envelope should be addressed as directed on Page 1 of the solicitation.

If a proposal not contained in the special envelope is mailed, the offeror takes the risk that the envelope, even if marked as described above, may be inadvertently opened and the information compromised which may cause the proposal to be disqualified. Proposals may be hand delivered to the designated location in the office issuing the solicitation. No other correspondence or other proposals should be placed in the envelope.

- D. LATE PROPOSALS: To be considered for selection, proposals shall be received by the issuing office by the designated date and hour. The official time used in the receipt of proposals is that time on the automatic time stamp machine in the issuing office. Proposals received in the issuing office after the date and hour designated are automatically non-responsive and will not be considered. The University is not responsible for delays in the delivery of mail by the U.S. Postal Service, private couriers, or the intra-university mail system. It is the sole responsibility of the offeror to ensure that its proposal reaches the issuing office by the designated date and hour.
- E. UNDERSTANDING OF REQUIREMENTS: It is the responsibility of each offeror to inquire about and clarify any requirements of this solicitation that is not understood. The University will not be bound by oral explanations as to the meaning of specifications or language contained in this solicitation. Therefore, all inquiries deemed to be substantive in nature must be in writing and submitted to the responsible buyer in the Procurement Services Office. Offerors must ensure that written inquiries reach the buyer at least five (5) days prior to the time set for receipt of offerors proposals. A copy of all queries and the respective response will be provided in the form of an addendum to all offerors who have indicated an interest in responding to this solicitation. Your signature on your Offer certifies that you fully understand all facets of this solicitation. These questions may be sent via email directly to the Procurement Officer listed on the signature page of this solicitation or by Fax to 540/568-7935.
- F. RENEWAL OF CONTRACT: This contract may be renewed by the Commonwealth for a period of nine (9) successive one year periods under the terms and conditions of the original contract except as stated in 1. and 2. below. Price increases may be negotiated only at the time of renewal. Written notice of the Commonwealth's intention to renew shall be given approximately 90 days prior to the expiration date of each contract period.
1. If the Commonwealth elects to exercise the option to renew the contract for an additional one-year period, the contract price(s) for the additional one year shall not exceed the contract price(s) of the original contract increased/decreased by no more than the percentage increase/decrease of the other services category of the CPI-W section of the Consumer Price Index of the United States Bureau of Labor Statistics for the latest twelve months for which statistics are available.
 2. If during any subsequent renewal periods, the Commonwealth elects to exercise the option to renew the contract, the contract price(s) for the subsequent renewal period shall not exceed the contract price(s) of the previous renewal period increased/decreased by more than the percentage increase/decrease of the other services category of the CPI-W section

of the Consumer Price Index of the United States Bureau of Labor Statistics for the latest twelve months for which statistics are available.

- G. SUBMISSION OF INVOICES: All invoices shall be submitted within sixty days of contract term expiration for the initial contract period as well as for each subsequent contract renewal period. Any invoices submitted after the sixty day period will not be processed for payment.
- H. OPERATING VEHICLES ON JAMES MADISON UNIVERSITY CAMPUS: Operating vehicles on sidewalks, plazas, and areas heavily used by pedestrians is prohibited. In the unlikely event a driver should find it necessary to drive on James Madison University sidewalks, plazas, and areas heavily used by pedestrians, the driver must yield to pedestrians. For a complete list of parking regulations, please go to www.jmu.edu/parking; or to acquire a service representative parking permit, contact Parking Services at 540.568.3300. The safety of our students, faculty and staff is of paramount importance to us. Accordingly, violators may be charged.
- I. COOPERATIVE PURCHASING / USE OF AGREEMENT BY THIRD PARTIES: It is the intent of this solicitation and resulting contract(s) to allow for cooperative procurement. Accordingly, any public body, (to include government/state agencies, political subdivisions, etc.), cooperative purchasing organizations, public or private health or educational institutions or any University related foundation and affiliated corporations may access any resulting contract if authorized by the Contractor.

Participation in this cooperative procurement is strictly voluntary. If authorized by the Contractor(s), the resultant contract(s) will be extended to the entities indicated above to purchase goods and services in accordance with contract terms. As a separate contractual relationship, the participating entity will place its own orders directly with the Contractor(s) and shall fully and independently administer its use of the contract(s) to include contractual disputes, invoicing and payments without direct administration from the University. No modification of this contract or execution of a separate agreement is required to participate; however, the participating entity and the Contractor may modify the terms and conditions of this contract to accommodate specific governing laws, regulations, policies, and business goals required by the participating entity. Any such modification will apply solely between the participating entity and the Contractor.

The Contractor will notify the University in writing of any such entities accessing this contract. The Contractor will provide semi-annual usage reports for all entities accessing the contract. The University shall not be held liable for any costs or damages incurred by any other participating entity as a result of any authorization by the Contractor to extend the contract. It is understood and agreed that the University is not responsible for the acts or omissions of any entity and will not be considered in default of the contract no matter the circumstances.

Use of this contract(s) does not preclude any participating entity from using other contracts or competitive processes as needed.

- J. SMALL BUSINESS SUBCONTRACTING AND EVIDENCE OF COMPLIANCE:
 - 1. It is the goal of the Commonwealth that 40% of its purchases are made from small businesses. This includes discretionary spending in prime contracts and subcontracts. All potential bidders/offerors are required to submit a Small Business Subcontracting Plan. Unless the bidder/offeror is registered as a DMBE-certified small business and where it is practicable for any portion of the awarded contract to be subcontracted to other suppliers, the contractor is encouraged to offer such subcontracting opportunities to DMBE-certified

small businesses. This shall not exclude DMBE-certified women-owned and minority-owned businesses when they have received DMBE small business certification. No bidder/offeror or subcontractor shall be considered a Small Business, a Women-Owned Business or a Minority-Owned Business unless certified as such by the Department of Minority Business Enterprise (DMBE) by the due date for receipt of bids or proposals. If small business subcontractors are used, the prime contractor agrees to report the use of small business subcontractors by providing the purchasing office at a minimum the following information: name of small business with the DMBE certification number or FEIN, phone number, total dollar amount subcontracted, category type (small, women-owned, or minority-owned), and type of product/service provided. **This information shall be submitted to: JMU Office of Procurement Services, Attn: SWAM Subcontracting Compliance, MSC 5720, Harrisonburg, VA 22807.**

2. Each prime contractor who wins an award in which provision of a small business subcontracting plan is a condition of the award, shall deliver to the contracting agency or institution with every request for payment, evidence of compliance (subject only to insubstantial shortfalls and to shortfalls arising from subcontractor default) with the small business subcontracting plan. **This information shall be submitted to: JMU Office of Procurement Services, SWAM Subcontracting Compliance, MSC 5720, Harrisonburg, VA 22807.** When such business has been subcontracted to these firms and upon completion of the contract, the contractor agrees to furnish the purchasing office at a minimum the following information: name of firm with the DMBE certification number or FEIN number, phone number, total dollar amount subcontracted, category type (small, women-owned, or minority-owned), and type of product or service provided. Payment(s) may be withheld until compliance with the plan is received and confirmed by the agency or institution. The agency or institution reserves the right to pursue other appropriate remedies to include, but not be limited to, termination for default.
 3. Each prime contractor who wins an award valued over \$200,000 shall deliver to the contracting agency or institution with every request for payment, information on use of subcontractors that are not DMBE-certified small businesses. When such business has been subcontracted to these firms and upon completion of the contract, the contractor agrees to furnish the purchasing office at a minimum the following information: name of firm, phone number, FEIN number, total dollar amount subcontracted, and type of product or service provided. **This information shall be submitted to: JMU Office of Procurement Services, Attn: SWAM Subcontracting Compliance, MSC 5720, Harrisonburg, VA 22807.**
- K. AUTHORIZATION TO CONDUCT BUSINESS IN THE COMMONWEALTH: A contractor organized as a stock or nonstock corporation, limited liability company, business trust, or limited partnership or registered as a registered limited liability partnership shall be authorized to transact business in the Commonwealth as a domestic or foreign business entity if so required by Title 13.1 or Title 50 of the Code of Virginia or as otherwise required by law. Any business entity described above that enters into a contract with a public body shall not allow its existence to lapse or its certificate of authority or registration to transact business in the Commonwealth, if so required under Title 13.1 or Title 50, to be revoked or cancelled at any time during the term of the contract. A public body may void any contract with a business entity if the business entity fails to remain in compliance with the provisions of this section.
- L. PUBLIC POSTING OF COOPERATIVE CONTRACTS: James Madison University maintains a web-based contracts database with a public gateway access. Any resulting cooperative contract/s to this solicitation will be posted to the publicly accessible website. Contents identified as proprietary information will not be made public.

- M. CRIMINAL BACKGROUND CHECKS OF PERSONNEL ASSIGNED BY CONTRACTOR TO PERFORM WORK ON JMU PROPERTY: The Contractor shall obtain criminal background checks on all of their contracted employees who will be assigned to perform services on James Madison University property. The results of the background checks will be directed solely to the Contractor. The Contractor bears responsibility for confirming to the University contract administrator that the background checks have been completed prior to work being performed by their employees or subcontractors. The Contractor shall only assign to work on the University campus those individuals whom it deems qualified and permissible based on the results of completed background checks. Notwithstanding any other provision herein, and to ensure the safety of students, faculty, staff and facilities, James Madison University reserves the right to approve or disapprove any contract employee that will work on JMU property. Disapproval by the University will solely apply to JMU property and should have no bearing on the Contractor's employment of an individual outside of James Madison University.
- N. INDEMNIFICATION: Contractor agrees to indemnify, defend and hold harmless the Commonwealth of Virginia, its officers, agents, and employees from any claims, damages and actions of any kind or nature, whether at law or in equity, arising from or caused by the use of any materials, goods, or equipment of any kind or nature furnished by the contractor/any services of any kind or nature furnished by the contractor, provided that such liability is not attributable to the sole negligence of the using agency or to failure of the using agency to use the materials, goods, or equipment in the manner already and permanently described by the contractor on the materials, goods or equipment delivered.
- O. ADDITIONAL GOODS AND SERVICES: The University may acquire other goods or services that the supplier provides than those specifically solicited. The University reserves the right, subject to mutual agreement, for the Contractor to provide additional goods and/or services under the same pricing, terms, and conditions and to make modifications or enhancements to the existing goods and services. Such additional goods and services may include other products, components, accessories, subsystems, or related services that are newly introduced during the term of this Agreement. Such additional goods and services will be provided to the University at favored nations pricing, terms, and conditions.
- P. ADVERTISING: In the event a contract is awarded for supplies, equipment, or services resulting from this bid/proposal, no indication of such sales or services to James Madison University will be used in product literature or advertising. The contractor shall not state in any of its advertising or product literature that James Madison University has purchased or uses any of its products or services, and the contractor shall not include James Madison University in any client list in advertising and promotional materials.
- Q. ELECTRICAL EQUIPMENT STANDARDS: All equipment/material shall conform to the latest issue of all applicable standards as established by National Electrical Manufacturer's Association (NEMA), American National Standards Institute (ANSI), and Occupational Safety & Health Administration (OSHA). All equipment and material, for which there are OSHA standards, shall bear an appropriate label of approval for use intended from a Nationally Recognized Testing Laboratory (NRTL).
- R. PRIME CONTRACTOR RESPONSIBILITIES: The contractor shall be responsible for completely supervising and directing the work under this contract and all subcontractors that he may utilize, using his best skill and attention. Subcontractors who perform work under this contract shall be responsible to the prime contractor. The contractor agrees that he is as fully

responsible for the acts and omissions of his subcontractors and of persons employed by them as he is for the acts and omissions of his own employees.

- S. SUBCONTRACTS: No portion of the work shall be subcontracted without prior written consent of the purchasing agency. In the event that the contractor desires to subcontract some part of the work specified herein, the contractor shall furnish the purchasing agency the names, qualifications and experience of their proposed subcontractors. The contractor shall, however, remain fully liable and responsible for the work to be done by its subcontractor(s) and shall assure compliance with all requirements of the contract.
- T. CONTINUITY OF SERVICES: The Contractor recognizes that the services under this contract are vital to the Agency and must be continued without interruption and that, upon contract expiration, a successor, either the Agency or another contractor, may continue them. The Contractor agrees:
1. To exercise its best efforts and cooperation to effect an orderly and efficient transition to a successor;
 2. To make all Agency owned facilities, equipment, and data available to any successor at an appropriate time prior to the expiration of the contract to facilitate transition to successor; and
 3. That the Agency Contracting Officer shall have final authority to resolve disputes related to the transition of the contract from the Contractor to its successor.

The Contractor shall, upon written notice from the Contract Officer, furnish phase-in/phase-out services for up to ninety (90) days after this contract expires and shall negotiate in good faith a plan with the successor to execute the phase-in/phase-out services. This plan shall be subject to the Contract Officer's approval.

The Contractor shall be reimbursed for all reasonable, pre-approved phase-in/phase-out costs (i.e., costs incurred within the agreed period after contract expiration that result from phase-in, phase-out operations) and a fee (profit) not to exceed a pro rata portion of the fee (profit) under this contract. All phase-in/phase-out work fees must be approved by the Contract Officer in writing prior to commencement of said work.

- U. NEW EQUIPMENT: Unless otherwise expressly stated in this solicitation, any equipment furnished under the contract shall be new, unused equipment.
- V. REPAIR PARTS: In the event that the performance of maintenance services under the contract results in a need to replace defective parts, such items may only be replaced by new parts. In no instance shall the contractor be permitted to replace defective items with refurbished, remanufactured, or surplus items without prior written authorization of the Commonwealth.
- W. EXCESSIVE DOWNTIME: Equipment or software furnished under the contract shall be capable of continuous operation. Should the equipment or software become inoperable for a period of more than 24 hours, the contractor agrees to pro-rate maintenance charges to account for each full day of inoperability. The period of inoperability shall commence upon initial notification. In the event the equipment or software remains inoperable for more than two consecutive calendar days, the contractor shall promptly replace the equipment or software at no charge upon request of the procuring agency. Such replacement shall be with new, unused product(s) of comparable quality, and must be installed and operational within two days following the request for replacement.

- X. WORK SITE DAMAGES: Any damage to existing utilities, equipment or finished surfaces resulting from the performance of this contract shall be repaired to the Commonwealth's satisfaction at the contractor's expense.
- Y. WARRANTY (COMMERCIAL): The contractor agrees that the goods or services furnished under any award resulting from this solicitation shall be covered by the most favorable commercial warranties the contractor gives any customer for such goods or services and that the rights and remedies provided therein are in addition to and do not limit those available to the Commonwealth by any other clause of this solicitation. A copy of this warranty should be furnished with the proposal.
- Z. WARRANTY AGAINST SHUTDOWN DEVICES: The contractor warrants that the equipment and software provided under the contract shall not contain any lock, counter, CPU reference, virus, worm, or other device capable of halting operations or erasing or altering data or programs. Contractor further warrants that neither it, nor its agents, employees, or subcontractors shall insert any shutdown device following delivery of the equipment and software.
- AA. QUALIFIED REPAIR PERSONNEL: All warranty or maintenance services to be performed on the items specified in this solicitation as well as any associated hardware or software shall be performed by qualified technicians properly authorized by the manufacturer to perform such services. The Commonwealth reserves the right to require proof of certification prior to award and at any time during the term of the contract.
- BB. STANDARDS OF CONDUCT: The work site will be occupied by students and University Personnel during the times work is performed. Contractor and Contractor's personnel shall exercise a particularly high level of discipline, safety and cooperation at all times while on the job site. The Contractor shall be responsible for controlling employee conduct, for assuring that its employees are not boisterous or rude, and assuring that they are not engaging in any destructive or criminal activity. The Contractor is also responsible for ensuring that its employees do not disturb papers on desks, or open desk drawers, cabinets, or briefcases, or use State phones, and the like, except as authorized.
- CC. KEYS: If the Contractor is given keys for this project, it is the Contractor's responsibility to return the keys when the contract is terminated, as well as for the safekeeping of the keys during the contract period. The Contractor shall not loan or duplicate the keys, and must report lose or stolen keys to JMU Telecom Director immediately. In the event the Contractor loses the keys, they will be charged for the replacement of the keys and any locks which are rekeyed or replaced.
- DD. RELOCATION OF EQUIPMENT: Should it become necessary to move equipment covered by the contract to another location, the Commonwealth reserves the right to do so at its own expense. If contractor supervision is required, the Commonwealth will provide prior written notice of the move at least thirty days in advance, in which case the contractor shall provide the required services and be reasonably compensated by the Commonwealth. Both the compensation to be paid and any adjustment to the maintenance terms resulting from the move shall be as mutually agreed between the parties. Regular maintenance charges shall be suspended on the day the equipment is dismantled and resume once the equipment is again certified ready for operational use.
- EE. PRODUCT SUBSTITUTION: During the term of any contract resulting from this solicitation, the Contractor is not authorized to substitute any item for that product and/or

software identified in the solicitation without the prior written consent of the Contracting Officer whose name appears on the front of this solicitation, or their designee.

- FF. SERVICE REPORTS: Upon completion of any maintenance call, the contractor shall provide the agency with a signed service report that includes, at a minimum: a general statement as to the problem, action taken, any materials or parts furnished or used, and the number of hours required to complete the repairs.
- GG. OPERATIONAL COMPONENTS: Unless otherwise requested in the solicitation, stated equipment prices shall include all cables, connectors, interfaces, documentation for all components, and any other items necessary for full systems operation at the user site. This does not include consumable supplies such as paper, tapes, disks, etc., unless such supplies are expressly identified in the *Pricing Schedule*.
- HH. EXTRA CHARGES NOT ALLOWED: The pricing shall be for complete installation ready for the Commonwealth's use and shall include all applicable freight and installation charges; extra charges will not be allowed.
- II. RENEWAL OF MAINTENANCE: Maintenance of the hardware or software specified in the resultant contract may be renewed by the mutual written agreement of both parties for additional one-year periods, under the terms and conditions of the original contract except as noted herein. Price changes may be negotiated at time of renewal; however, in no case shall the maintenance costs for a succeeding one-year period exceed the prior year's contract price(s), increased or decreased by more than the percentage increase or decrease in the other services category of the CPI-W section of the US Bureau of Labor Statistics Consumer Price Index, for the latest twelve months for which statistics are available.
- JJ. SERVICE PERIOD (EXTENDED): Due to the criticality of the applications for which the equipment and/or software is purchased, the contractor shall provide 24 hours a day, 7 days a week, maintenance support, including state holidays. On-site response time shall be within 12-24 hours following initial notification. All necessary repairs or corrections shall be completed within 72 hours of the initial notification.
- KK. SERVICE PERIOD (ROUTINE): Contractor shall provide 24-hour toll free phone support with a 24 hour return call response time. On-site maintenance services shall carry a 12-24 hour response time following initial notification and be available during the normal working hours of 8 A.M. to 5 P.M. Monday through Friday, excluding state holidays. All necessary repairs or corrections shall be completed within 72 hours of the initial notification.
- LL. CONTRACTOR REGISTRATION: If a contract for construction, removal, repair or improvement of a building or other real property is for \$120,000 or more, or if the total value of all such contracts undertaken by offeror within any 12-month period is \$750,000 or more, the offeror is required under Title 54.1-1100, Code of Virginia (1950), as amended, to be licensed by the State Board of Contractors a "CLASS A CONTRACTOR." If such a contract is for \$10,000 or more but less than \$120,000, or if the total value of all such contracts undertaken by offeror within any 12-month period is \$150,000 or more, but less than \$750,000 or more, the offeror is required to be licensed as a "CLASS B CONTRACTOR." If such a contract is over \$1,000 but less than \$10,000, or if the contractor does less than \$150,000 in business in a 12-month period, the offeror is required to be licensed as a "CLASS C CONTRACTOR." The board shall require a master tradesmen license as a condition of licensure for electrical, plumbing and heating, ventilation and air conditioning contractors. The offeror shall place on the outside of the envelope containing the proposal and shall place in the

proposal over his signature whichever of the following notations is appropriate, inserting his contractor license number:

Licensed Class A Virginia Contractor No. _____ Specialty _____
Licensed Class B Virginia Contractor No. _____ Specialty _____
Licensed Class C Virginia Contractor No. _____ Specialty _____

If the offeror shall fail to provide this information on his proposal or on the envelope containing the proposal and shall fail to promptly provide said contractor license number to the Commonwealth in writing when requested to do so before or after the opening of proposals, he shall be deemed to be in violation of § 54.1-1115 of the *Code of Virginia* (1950), as amended, and his proposal will not be considered.

If a offeror shall fail to obtain the required license prior to submission of his proposal, the proposal shall not be considered

- MM. DELIVERY AND STORAGE: It shall be the responsibility of the contractor to make all arrangements for delivery, unloading, receiving and storing materials in the building during installation. The owner will not assume any responsibility for receiving these shipments. Contractor shall check with the owner and make necessary arrangements for security and storage space in the building during installation.
- NN. FINAL INSPECTION: At the conclusion of the work, the contractor shall demonstrate to the authorized owner's representative that the work is fully operational and in compliance with contract specifications and codes. Any deficiencies shall be promptly and permanently corrected by the contractor at the contractor's sole expense prior to final acceptance of the work.
- OO. MAINTENANCE MANUALS: The contractor shall provide with each piece of equipment an operations and maintenance manual with wiring diagrams, parts list, and a copy of all warranties.
- PP. INSTALLATION: All items must be assembled and set in place, ready for use. All crating and other debris must be removed from the premises.
- QQ. AS BUILT DRAWINGS: The contractor shall provide the Commonwealth a clean set of reproducible "as built" drawings and wiring diagrams, marked to record all changes made during installation or construction. The contractor shall also provide the Commonwealth with maintenance manuals, parts lists and a copy of all warranties for all equipment. All "as built" drawings and wiring diagrams, maintenance manuals, parts lists and warranties shall be delivered to the Commonwealth upon completion of the work and prior to final payment.
- RR. CONTRACTOR'S TITLE TO MATERIALS: No materials or supplies for the work shall be purchased by the contractor or by any subcontractor subject to any chattel mortgage or under a conditional sales or other agreement by which an interest is retained by the seller. The contractor warrants that he has clear title to all materials and supplies for which he invoices for payment.

IV. METHOD OF PAYMENT

The contractor will be paid based on invoices submitted in accordance with the solicitation and any negotiations. James Madison University recognizes the importance of expediting the payment

process for our vendors and suppliers; we request that our vendors and suppliers enroll in our bank's Comprehensive Payable options: either the Virtual Payables Virtual Card or the PayMode-X electronic deposit (ACH) to your bank account so that future payments are made electronically. Contractors signed up for the Virtual Payables process will receive the benefit of being paid Net 15. Additional information is available online at:

<http://www.jmu.edu/financeoffice/accounting-operations-disbursements/cash-investments/vendor-payment-methods.shtml>

V. PRICING SCHEDULE

The offeror shall provide pricing for all products and services included in proposal indicating one-time and on-going costs. The resulting contract will be cooperative and pricing shall be inclusive for the attached Zone Map, of which JMU falls within Zone 2 *Attachment D*.

Specify any associated charge card processing fees, if applicable, to be billed to the university.

Pricing items to provide information for:

- Pricing for proposed maintenance of existing system as described in this RFP, beginning in section IV.B.8. and inventoried in *Attachment H*. Specify singular or multiyear pricing.
- Pricing for a turnkey design, install, and commission of PS DAS in accordance with JMU's standardized PS DAS design specifications as outlined in this RFP beginning in section IV.B. and in *Attachment F*. Including multiple Warranty options requested in B.7. and Maintenance descriptions in B.8. If awarded, please specify how long this pricing would be available to JMU.
- Pricing, to be optional, for vendor monitoring of on-campus DAS Systems, referenced at the bottom of the opening Statement of Needs description.
- Provide a table of labor rates for the various types of work necessary to meet the needs of the work outlined in this RFP in event of change order or ad hoc services not included in the proposed packages above. Include rates for work done outside of normal business hours and specify if remote service or on-prem, inclusive of travel.
- Pricelist with MSRP and JMU discount for will call work for services not covered under warranty or maintenance.
- Pricing for any training associated with proposed solutions.
- Pricing for any other products or services you offer in addition to those outlined in this RFP.

*For all projects, price inclusive of travel rather than reimbursement.

VI. ATTACHMENTS

Attachment A: Offeror Data Sheet

Attachment B: Small, Women, and Minority-owned Business (SWaM) Utilization Plan

Attachment C: Standard Contract Sample

Attachment D: Zone Map

Attachment E: SWaM Sub-contractor Reporting Template (attached separately Excel)

Attachment F: Public Safety DAS Specification (attached separately PDF)

Attachment G: Sample Building Drawing (attached separately PDF)

Attachment H: DAS Inventory (attached separately PDF)

ATTACHMENT A

OFFEROR DATA SHEET

TO BE COMPLETED BY OFFEROR

1. QUALIFICATIONS OF OFFEROR: Offerors must have the capability and capacity in all respects to fully satisfy the contractual requirements.
2. YEARS IN BUSINESS: Indicate the length of time you have been in business providing these types of goods and services.

Years _____ Months _____

3. REFERENCES: Indicate below a listing of at least five (5) organizations, either commercial or governmental/educational, that your agency is servicing. Include the name and address of the person the purchasing agency has your permission to contact.

CLIENT	LENGTH OF SERVICE	ADDRESS	CONTACT PERSON/PHONE #
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4. List full names and addresses of Offeror and any branch offices which may be responsible for administering the contract.

5. RELATIONSHIP WITH THE COMMONWEALTH OF VIRGINIA: Is any member of the firm an employee of the Commonwealth of Virginia who has a personal interest in this contract pursuant to the [CODE OF VIRGINIA](#), SECTION 2.2-3100 – 3131?

[] YES [] NO

IF YES, EXPLAIN: _____

ATTACHMENT B

Small, Women and Minority-owned Businesses (SWaM) Utilization Plan

Offeror Name: _____ **Preparer Name:** _____

Date: _____

Is your firm a **Small Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes _____ No _____

If yes, certification number: _____ Certification date: _____

Is your firm a **Woman-owned Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes _____ No _____

If yes, certification number: _____ Certification date: _____

Is your firm a **Minority-Owned Business Enterprise** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes _____ No _____

If yes, certification number: _____ Certification date: _____

Is your firm a **Micro Business** certified by the Department of Small Business and Supplier Diversity (SBSD)? Yes _____ No _____

If yes, certification number: _____ Certification date: _____

Instructions: *Populate the table below to show your firm's plans for utilization of small, women-owned and minority-owned business enterprises in the performance of the contract. Describe plans to utilize SWAMs businesses as part of joint ventures, partnerships, subcontractors, suppliers, etc.*

Small Business: "Small business " means a business, independently owned or operated by one or more persons who are citizens of the United States or non-citizens who are in full compliance with United States immigration law, which, together with affiliates, has 250 or fewer employees, or average annual gross receipts of \$10 million or less averaged over the previous three years.

Woman-Owned Business Enterprise: A business concern which is at least 51 percent owned by one or more women who are U.S. citizens or legal resident aliens, or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in which is owned by one or more women, and whose management and daily business operations are controlled by one or more of such individuals. **For purposes of the SWAM Program, all certified women-owned businesses are also a small business enterprise.**

Minority-Owned Business Enterprise: A business concern which is at least 51 percent owned by one or more minorities or in the case of a corporation, partnership or limited liability company or other entity, at least 51 percent of the equity ownership interest in which is owned by one or more minorities and whose management and daily business operations are controlled by one or more of such individuals. **For purposes of the SWAM Program, all certified minority-owned businesses are also a small business enterprise.**

Micro Business is a certified Small Business under the SWaM Program and has no more than twenty-five (25) employees **AND** no more than \$3 million in average annual revenue over the three-year period prior to their certification.

All small, women, and minority owned businesses must be certified by the Commonwealth of Virginia Department of Small Business and Supplier Diversity (SBSD) to be counted in the SWAM program. Certification applications are available through SBSD at 800-223-0671 in Virginia, 804-786-6585 outside Virginia, or online at <http://www.sbsd.virginia.gov/> (Customer Service).

RETURN OF THIS PAGE IS REQUIRED

ATTACHMENT B (CNT'D)
Small, Women and Minority-owned Businesses (SWaM) Utilization Plan

Procurement Name and Number: _____

Date Form Completed: _____

Listing of Sub-Contractors, to include, Small, Woman Owned and Minority Owned Businesses
for this Proposal and Subsequent Contract

Offeror / Proposer: _____

Firm

Address

Contact Person/No.

Sub-Contractor's Name and Address	Contact Person & Phone Number	SBSD Certification Number	Services or Materials Provided	Total Subcontractor Contract Amount (to include change orders)	Total Dollars Paid Subcontractor to date (to be submitted with request for payment from JMU)

(Form shall be submitted with proposal and if awarded, a SWaM Sub-contractor Reporting Form shall be submitted to swamreporting@jmu.edu)

RETURN OF THIS PAGE IS REQUIRED

ATTACHMENT C



COMMONWEALTH OF VIRGINIA
STANDARD CONTRACT

Contract No. _____

This contract entered into this _____ day of _____, 20____, by _____ hereinafter called the "Contractor" and Commonwealth of Virginia, James Madison University called the "Purchasing Agency".

WITNESSETH that the Contractor and the Purchasing Agency, in consideration of the mutual covenants, promises and agreements herein contained, agree as follows:

SCOPE OF CONTRACT: The Contractor shall provide the services to the Purchasing Agency as set forth in the Contract Documents.

PERIOD OF PERFORMANCE: From _____ through _____

The contract documents shall consist of:

- (1) This signed form;
- (2) The following portions of the Request for Proposals dated _____:
 - (a) The Statement of Needs,
 - (b) The General Terms and Conditions,
 - (c) The Special Terms and Conditions together with any negotiated modifications of those Special Conditions;
 - (d) List each addendum that may be issued
- (3) The Contractor's Proposal dated _____ and the following negotiated modification to the Proposal, all of which documents are incorporated herein.
 - (a) Negotiations summary dated _____.

IN WITNESS WHEREOF, the parties have caused this Contract to be duly executed intending to be bound thereby.

CONTRACTOR:

PURCHASING AGENCY:

By: _____
(Signature)

By: _____
(Signature)

(Printed Name)

(Printed Name)

Title: _____

Title: _____

ATTACHMENT D

Zone Map



Virginia Association of State College & University Purchasing Professionals (VASCUPP)

List of member institutions by zones

<u>Zone 1</u> George Mason University (Fairfax)	<u>Zone 2</u> James Madison University (Harrisonburg)	<u>Zone 3</u> University of Virginia (Charlottesville)
<u>Zone 4</u> University of Mary Washington (Fredericksburg)	<u>Zone 5</u> Christopher Newport University (Newport News) College of William and Mary (Williamsburg) Norfolk State University (Norfolk) Old Dominion University (Norfolk)	<u>Zone 6</u> Virginia Commonwealth University (Richmond) Virginia State University (Petersburg)
<u>Zone 7</u> Longwood University (Farmville)	<u>Zone 8</u> Virginia Military Institute (Lexington) Virginia Tech (Blacksburg) Radford University (Radford)	<u>Zone 9</u> University of Virginia - Wise (Wise)

Reporting Instructions

- 1) Complete all information accurately
- 2) Contact Phillip Ewell (swamreporting@jmu.edu, ewellpw@jmu.edu or 540-568-7999) to discuss questions or concerns with reporting on this form
- 3) Include the Schedule of Values No.(s) that relate to the payments received and being reported on the current reporting (*please note the Schedule of Values number(s) on this report **may not be** the same as the one you are submitting the form with*)
- 4) ALL sub-contractors should be reported, even if they are not currently SWAM certified (*our staff will attempt to contact them to see if they are capable of certifying*)
- 5) The Schedule of Values should be completed entirely with a vendor name included regardless of whether you believe the firm is SWAM or not - this helps for matching between this report and the Schedule of Values - it also helps us to continue to follow up on certifications with vendors that may not be currently certified.
- 6) Suppliers should be reported as they are considered the same as sub-contractors

JMU Contract Number:	"contract number"
Name of Prime Contractor:	"name"
SWAM Reporter Contact:	"contact name"
SWAM Reporter Contact E-mail:	"e-mail"
SWAM Reporter Contact Phone:	"phone"
Prime Contractor Fed. Tax ID:	"FEIN"
Prime Contractor SWAM #: (if applicable)	"cert #"

*Subcontractor Reporting Form must be completed and submitted quarterly to swamreporting@jmu.edu *Payment may be withheld by terms of the contract if complete and accurate information is not submitted *For questions or concerns contact Phillip Ewell (swamreporting@jmu.edu or 540-568-7999)

RF901 - JMU PUBLIC SAFETY DAS - SPECIFICATIONS (Published Revision 2024-12-15)

JMU DAS/BDA Specifications and Scope of Work:

- This Public Safety DAS Specification shall apply to all JMU DAS/BDA Systems installed on JMU owned or operated facilities.
- Any variances, discrepancies, or additional requirements from this standardized specification for JMU DAS/BDA Systems will be addressed in the corresponding sections of a separate but specific site related **Scope Of Work** which will be issued prior to the time of procurement for any DAS/BDA design for new building, building refresh or system upgrade.

JMU DAS/BDA Ownership:

- Public Safety DAS/BDA Ownership and Administration in JMU Owned Buildings will be by the JMU IT Telecom Department; MSC 5732 – JMAC1, 1021 S Main St, Harrisonburg, VA 22807; Phone 540-568-6471.

JMU Public Safety DAS/BDA Systems Must Support Enhanced Communications for:

- 450-470 MHz LMR for JMU Legacy UHF System
- 806-869 MHz NPSPAC channels for Local HRECC P25 Public Safety Trunked 800 MHz System usage.
- 700 MHz Band 14 FirstNet LTE in anticipation of migration to the FirstNet Public Safety Network in Virginia is not a requirement for Band 14 coverage in the DAS today.
- It is anticipated that all the services will be taken over the air and the proposed DAS network should include rooftop donor antennas for each service and each signal source. It is not a requirement to provide a donor antenna for FirstNet at this time, although connectivity and an appropriately sized roof penetration should be provided for future installation of additional donor antennas and cabling to support 700 MHz FirstNet.
- The proposed system should also be able to support connectivity for a local base station for FirstNet.

Location of Current Radio System Sources for the UHF 450-470 MHz and 800 MHz bands:

- **UHF JMU Frequencies to be repeated:**
 - UHF Frequencies DownLinks (DL) and UpLinks (UL) are listed in MHz
 - All UpLinks (UL) are 5 MHz higher than the (DL) frequencies
 - **UHF Donor Site 1:**
 - **JMUPD** (DL) 453.9000 (UL) 458.9000 TONE: 167.9
 - **ADMIN** (DL) 453.6250 (UL) 458.6250 TONE: 107.2
 - Repeater Site: Showker Hall, 421 Bluestone Dr, Harrisonburg, VA 22807
(Located on elevator rooftop penthouse)
 - GIS: LAT: 38°26'00" N LONG: 78°52'21.6" W
 - **UHF Donor Site 2:**
 - **FM** (DL) 453.4250 (UL) 458.4250 TONE: 203.5
 - Repeater Site: Wilson Hall, 951 Madison Dr, Harrisonburg, VA 22807
(Located inside rooftop cupola)
 - GIS: LAT: 38-26-17.1 N LONG: 078-52-23.3 W
 - **UHF Donor Site 3:**
 - **B&G** (DL) 453.2250 (UL) 458.2250 TONE: 203.5
 - **UREC** (DL) 453.8125 (UL) 458.8125 TONE: 107.2
 - Repeater Site: ISAT/CS Building A1, 701 Carrier Dr, Harrisonburg, VA 22807
(Located on rooftop penthouse screening)
 - GIS: LAT: 38°26'03" N LONG: 78°51'44.9" W
 - **UHF Donor Site 4: (For Facilities Utilized by JMU Athletics)**
 - **Athletics – Game Ops** (DL) 464.9125 (UL) 469.9125 TONE: 141.3
 - **Athletics - Ticketing** (DL) 464.8375 (UL) 469.8375 TONE: 156.7
 - **Athletics – Marketing** (DL) 463.8500 (UL) 468.8500 TONE: 192.8
 - **Athletics – Fire Watch** (DL) 464.0750 (UL) 469.0750 TONE: 88.5
 - Repeater Site: Bridgeforth Stadium, 251 Bluestone Dr, Harrisonburg, VA 22807
(Top S/W Corner balcony railing)
 - GIS: LAT: 38°26'08.2" N LONG: 78°52'24.7" W

- **UHF Donor Site 5: (For Facilities Utilized by JMU Athletics)**
 - **Athletics – Arena** (DL) 462.1125 (UL) 467.1125 TONE: 162.2
 - Repeater Site: East Campus Parking Deck, 649 University Blvd., Harrisonburg, VA 22807
(Located on top of Stairwell C – repeater in cabinet on 4th floor elevator landing)
 - GIS: LAT: 38°25'51.8" N LONG: 78°51'25.5" W
- You may combine the signals from multiple UHF donor antennas with a combiner between the surge arrestors and the UHF repeater Donor port. The use of an Omni donor antenna may be a better way of aggregating multiple UHF serving sites into the system.

800 MHz HRECC trunked frequencies to be repeated.

- 800 Frequency DownLinks (DL) are listed in MHz.
- All UpLinks (UL) are 45 MHz lower than the DownLink (DL) frequencies.
- 800 MHz Donor is part of the HRECC P25 TRUNKED RADIO SYSTEM:
- HRECC Trunked Radio System Frequencies:
 - (DL) 851.4625 (UL) 806.4625
 - (DL) 851.5625 (UL) 806.5625
 - (DL) 852.1125 (UL) 807.1125
 - (DL) 852.3375 (UL) 807.3375
 - (DL) 852.6000 (UL) 807.6000
 - (DL) 852.6875 (UL) 807.6875
 - (DL) 852.8625 (UL) 807.8625
 - (DL) 853.1250 (UL) 808.1250
 - (DL) 853.1875 (UL) 808.1875
 - (DL) 853.3750 (UL) 808.3750
 - (DL) 853.9250 (UL) 808.9250
- Potential Donor Sites – AHJ has the final approval on the specific donor site to use.
 - Tower Site: Tower Street, 653 Tower St, Harrisonburg, VA 22802
 - GIS: LAT: 38°27'07.1" N LONG: 78°51'06.9" W
 - Tower Site: Stone Spring, 1565 Peach Grove Ave, Harrisonburg, VA 22801
 - GIS: LAT: 38°25'04.3" N LONG: 78°52'31.8" W
 - Tower Site: Massanutten Peak, 856 Rainier Rd, Massanutten, VA 22840
 - GIS: LAT: 38°23'34.2" N LONG: 78°46'11.5" W
 - Tower Site: Kaylor Hill, 1319 W Mosby Rd, Harrisonburg, VA 22801
 - GIS: LAT: 38°24'47.7" N LONG: 78°54'52.3" W
 - Tower Site: HRECC, 101 N Main St, Harrisonburg, VA 22802
 - GIS: LAT: 38°27'02.3" N LONG: 78°52'07.1" W

Designated Critical Area Coverage Requirements:

- Critical Areas specifically designated by JMU and AHJ include [REF: NFPA 1221, 9.6.7.4]:
 - ALL Elevators, Elevator Lobbies & Elevator Control Rooms
 - ALL Mechanical & Equipment Rooms
 - ALL Exit Stairwells
 - ALL Exit Passageways
 - ALL Areas of Refuge and/or Areas of Rescue Assistance
 - ALL Fire Control Rooms
 - ALL Command & Control Centers
 - ALL Commercial Kitchen and Food Preparation Areas
 - ALL HAZMAT Usage Areas (labs) and Storage Areas
 - ALL Sprinkler Sectional Valve Locations
 - ALL Standpipe Cabinets
 - Any other areas that may be designated by JMU and/or AHJ as Critical Areas for specific structures.

Delivered Audio Quality (DAQ) Requirements:

- JMU requires that BDA/DAS systems installed in JMU Facilities provide an overall targeted **[95/95 @ 4.0 DAQ = (*Speech easily understandable. Little noise or distortion. 95% of the time across 95% of the general coverage area.*)]** over the entire service area. In the presence of exigent circumstances that significantly hinder the ability to obtain a 4.0 DAQ, JMU may allow a minimal acceptance level of **[95/95 @ 3.4 DAQ = (*Speech understandable without repetition. Some noise or distortion present. 95% of the time across 95% of the general coverage area.*)]** for approval by JMU and the AHJ for both UHF and 800 Mhz. [REF: NFPA 1221, 9.6.7.5]
- Critical Areas in the buildings require **[99/99 @ DAQ 3.4 (*Speech understandable without repetition. Some noise or distortion present. 99% of the time across 99% of the critical coverage area.*)]** coverage or better by JMU and as approved by the AHJ for both UHF and 800 Mhz. [REF: NFPA 1221, 9.6.7.4]

Radio Signal Strength Coverage Requirements (RSSI in -dBm):

- In an effort to meet the JMU Targeted Standard of [95/95 @ 4.0 DAQ], Design Propagation Prediction Modeling for 800 MHz relative to Received Signal Strength Indicators (RSSI) of -95 dBm or better for the designated coverage areas.
- The entire coverage area shall meet the -95 dBm Minimum Propagation Signal Strength Requirements set forth in NFPA 1, 0.3.3 & 11.10; NFPA 72 and NFPA 1221.

- JMU and AHJ will test for 4.0 DAQ and 800 MHz Signal Strength using test transmissions and signal strength indicators on first responder public safety radios and other signal strength analyzers during walk through testing of completed projects to determine Delivered Audio Quality and Propagated Signal Strength for the overall coverage area and specifically in Designated Critical Areas and will note compliance on Final Approval & Acceptance Documentation.

System Design and Approval:

- Design, engineering and installation of the entire DAS by any contractor will require continued close communications and coordination efforts the JMU Project Manager (JMU PM), JMU IT Telecommunications Department (JMU ITT), JMU Public Safety (JMUPD), Local Fire Marshall's Office (AHJ) and with the VA State Fire Marshall (VSFM).
- An additional assessment of the coverage area shall be coordinated by the Contractor/Designers with the JMU PM and include JMU ITT, JMUPD, AHJ and the VSFM, to be conducted generally when the building is 85% complete to take into consideration construction design, environmental conditions and materials used that may be found to impede the distribution of radio frequency signal in the structure when it is 100% complete and that the system design accurately addresses system area coverage requirements. This will allow for conduits and additional power installation needs to be addressed while pull paths are still accessible and give JMU the opportunity to assess whether the system is over or under designed so they may approve any necessary change orders.
- Requirements set forth by first-responder code, ordinance, or the AHJ shall supersede the requirements described herein and shall be met in their entirety. It is the Contractor's responsibility to ensure that the system complies with all JMU, local and state codes, ordinances and/or requirements established by the AHJ (whichever is more stringent).
- The Contractors/Designers shall perform thorough reviews of the construction drawings and perform their site survey with the JMU representative prior to submitting the preliminary design document to include a color-coded Propagation Prediction Map that demonstrates proposed design meets specifications.

Electrical and Mechanical:

- Active equipment should be modern equipment only, and to the greatest extent, shall use modular design to facilitate potential upgrades and expansions.
- All operating parameters shall be stored in electrically alterable non-volatile memory technology and shall be field programmable.

- All equipment assemblies and sub-assemblies shall be shielded to the greatest extent possible to minimize susceptibility to electromagnetic interference from, or to other co-located and/or adjacent equipment in accordance with FCC approved standards.

Programming Software:

- Programming, alignment and service software shall be supplied. All programming software shall be the latest version and be licensed to JMU.
- System design, hardware and software shall be serviceable for not less than 5 years from date of acceptance.
- Required programming, alignment and service cable, as well as extender cards shall be supplied by contractor at time of installation.

Equipment Locations and Enclosures:

- Head end equipment should be located in the MDF or other room identified by JMU Telecom for this purpose where space is available to:
 - Support a 2' x 3' Wall Mounted Device weighing 100 lbs. with adequate clearance, power and ventilation.
 - Accommodate a Free-Standing Rack/Cabinet/Enclosure weighing up to 500 lbs. and occupying no more than 3'L x 3'W x 6'H of floor space with adequate clearance, power, and ventilation.
- Should remote hubs or amplifiers be required, wall space or rack space will be identified by JMU Telecom for the Contractor/Designer to install this equipment in IDFs, etc.
- All BDA/DAS RF Equipment Enclosures should be (at minimum) NEMA-4 TYPE or NEMA4X TYPE enclosures and/or RATING of IP65 or HIGHER for interior 19" equipment rack mounted hardware, and consistent with other code requirements.
- Stand Alone UPS Battery Enclosures should be NEMA-3R Complaint or higher
- Active equipment shall be supported safely to prevent falling or damage in normal use and maintenance.

Head End Design:

- System shall provide for independent donor downlink level control for each frequency for conventional channel, and band isolation controls for trunked channels, to allow for signal level modifications should the external radio source be relocated or reconfigured in the future.
- Uplink and downlink paths shall be equipped with automatic level or gain control to provide more consistent signal performance and protect from amplifier overload and intermodulation products.
- Critical network equipment shall provide SNMP alarm message capability compatible with existing JMU SNMP monitoring capabilities to indicate a condition or conditions that would disrupt or degrade DAS performance.
- All passive components must be sold and supported by a US headquartered manufacturer or supplier. The term 'supplier' does not include a Distributor; but the products can be procured through a distributor.
- The Contractor/Designer is responsible for proving routes for coaxial cabling.
- Equipment shall be FCC Type Certified for all proposed operating bands.
- All RF equipment provided shall be installed to comply with operational requirements of FCC authorizations and the manufacturer's FCC Type Certification.
- JMU Prefers Channelized Passive BDAs in both UHF 450 MHz and 800 MHz are our preferred system design in our structures if they can sufficiently meet coverage signal strength and audio quality requirements.
- Vendors interested in providing potential Active System design quotes or other alternative solutions may submit those proposals as secondary and separate to their Passive System proposals for possible consideration.

Cabling Selection, Design Layout and Supply:

- Cabling used in the DAS, including coaxial, solid copper and fiber-optic, shall be selected by the Contractor/Designer, so long as it is compliant with NFPA 72 and approved by JMU.
- Installation of indoor and outdoor antennas, bi-directional amplifiers, fiber RF distribution hardware, RF and optical cabling, filters, backup power, and all cabling and wiring required to interface, monitor and power supplied devices, etc., shall be the responsibility of the Contractor.

- The Contractor shall be responsible for installation of roof-mounted donor antennas fixed or on sleds, antenna connecting jumpers, grounding and termination, roof penetrations and sealing of said penetrations.

Interior Antennas:

- Internal DAS antennas should be chosen and installed with a balance towards minimizing aesthetic impact on the building and achieving dominant signal level inside the building. Ceiling, Wall Stand-off or Pole Mounts may need to be provided or painted by the installer to blend aesthetically with the surrounding color palette as approved by the University
- Samples of the indoor antennas and mounting options chosen for the DAS must be presented to JMU IT Telecom personnel managing the project prior to approval being given for the project design.
- All installations must be approved by JMU Engineering and be approved by the University for aesthetic and safety considerations before work begins.
- Selection of the specific antenna models for use inside the building structure shall be the responsibility of the Contractor/Designer.
- Antennas, cabling and mounting hardware in proposed areas should not be readily accessible by the public or non-maintenance personnel. In some cases, to be determined by JMU, additional tamper proof measures may be required.
- Unless otherwise specified, All DAS Antennas, splitters and cabling shall support multiple band width spectrums to include JMU UHF 450 MHz and Regional 800 MHz frequencies regardless of whether or not BDA's for both UHF 450 MHz and/or 800 MHz are initially installed.

Interior Cabling and Fittings:

- Cable routing will be coordinated with JMU Telecom and JMU FM Engineers to identify and utilize proposed and/or existing pathways within a structure that take into consideration the specific needs of this project and the potential needs for future projects when considering pathway, junctions, size and access portals to conduits. [REF: NFPA 70, 312.5(A-C)] [REF: NFPA 1221, 5.5]
- All Cabling will need to be neat, hidden out of sight in open ceiling systems, structural framing, poles, conduits, wire molding or raceways such that it is reasonably protected,

aesthetically acceptable or blends with surroundings and not easily accessible to the general public as approved by the University.

- All Vertical Riser Cabling inside the structure SHALL BE INSIDE of NFPA approved conduits and/or tubing as approved by AHJ.
- Horizontal cabling on separate floors IS NOT REQUIRED TO BE INSIDE of conduit and/or tubing, but must have a UL Certification of **CMP** or NEC Certification of **MPP** (cable meeting **CSA FT6** Flame Test or ANSI/NFPA 262 / UL 910 standards) for exposed cabling with fire retardant sheathing as approved by AHJ.
- All exposed Horizontal cabling in plenum areas must be (UL) **CMP** and/or (NEC) **MPP** Certified as approved by the AHJ or it will be required to be in NFPA approved conduit or tubing.
- All Horizontal cabling support systems need to be installed according to manufacturing specifications.
- Install electrical style junction boxes at each floor for Vertical Riser to Horizontal Cabling connections. These boxes must be labeled “DAS # FLOOR RISER CONNECTION”
- All Exposed Horizontal Cabling must terminate inside NFPA approved enclosures or electrical style junction boxes at junctures with riser cabling as approved by AHJ.
- All Vertical Riser Wiring Inside of Buildings, Conductors and Fiber-optic cables shall be installed in accordance with NFPA 70 in any one of the following wiring methods [REF: NFPA 1221, 5.5.2]:
 - Electrical Metallic Tubing
 - Intermediate Metal Conduit
 - Rigid Metal Conduit
 - Surface Metal Raceways
 - Rigid Polyvinyl Chloride Conduit only if specifically, pre-approved by AHJ [REF: NFPA 1221, 5.5.2.1]
- Splitters and couplers shall be independently and separately supported from the coax. In no case may the weight of the splitter or coupler be suspended only from the coax in any orientation. Wire or other supports for splitters and couplers shall attach to structure or other building components per governing code.
- Coax cables must be installed and supported in a fashion that meets local codes, or this project’s specifications for low voltage cabling.
- Coax cannot be installed as “laid on” or “lay-in” above tile ceilings. It must be suspended above the lay-in tile ceiling per local code requirements, and in accordance with

requirements for other interior low voltage communications cabling. Support with J-Hooks above lay-in ceilings not to exceed 5' on center [REF: TIA 569] is acceptable.

- Contractor/Designer shall provide appropriately sized conduit everywhere else as approved by JMU ITT and Engineering where penetrating partitions (floors or walls) that is adequate to prevent cable damage and capable of meeting potential future needs.
- The bend radii for ALL COAXIAL CABLE installs SHALL be within manufacturers specifications.
- Use of powered mechanical pullers on ANY coax cable is prohibited.
- Indoor Coaxial Cable from the Repeater Output for the indoor DAS must be at least:
 - (UL) **CMP** or (NEC) **MPP** rated outer jacket (Meeting CSA FT6 Flame Test Requirements).
 - Appropriately sized cabling, non-radiating, 50 ohms impedance.
 - Other corrugated coax cable substitutes for this coax are allowed under the following conditions. Must meet a return loss specification of > 30 dB at 400-900 MHz when used with the manufacturer's connectors specified for the cable.
- Coax connectors:
 - Connectors must be fully threaded onto the mating connector and torqued to manufacturer's specifications.
 - Cable end preparation must be done with manufacturer's precision, preset cable end preparation tools. Manual flaring tools must also be used for flare type connectors if offered for sale by the manufacturer; installing connectors without manual flaring of the outer conductor is not acceptable.
 - Cable integrity testing shall be completed by the installer by means of a Sweep Test with Spectrum Analyzer or other acceptable procedure at the time of install and meet minimum industry standards. Results of integrity test shall be included with "As-Built" documentation submitted by vendor/installer to JMU ITT upon project completion.
- Coax surge arrestors:
 - 50 ohm type using gas tube surge arrestors.

- Maximum gas tube break over voltage shall be 90V.
- Connectors used in the system must meet the performance standards equivalent to or greater than an N-Type Connector.
- Must include grounding stud or lug connection on surge arrestor body which may be removable.
- Stainless steel or nickel plated brass body.
- Indoor splitters and couplers:
 - 50-ohm impedance.
 - Industry standard coupling values of 6, 10, 15 and 20 dB for couplers must be used.
 - Use of either Wilkinson type splitters or 'tappers' is allowed.
 - Connectors used in the system must meet the performance standards equivalent to or greater than an N-Type connector.
 - Machined metal outer housing painted, anodized or passivated for corrosion resistance.
 - Frequency range must be specified for the 450-900 MHz frequency range or greater.

Exterior Antennas:

- External donor antennas should be installed in compliance with industry standards and methodology.
- The Contractor/Designer will work with JMU to identify all donor antenna locations. All installations must be approved by JMU Engineering and be approved by the University for aesthetic and safety considerations before work begins.
- Antenna location, type, and height should all be taken into consideration based on the potential installation of parapet walls, sunken rooftop mechanical equipment areas, final roof treatments, and other potential aesthetic barriers that may block or prohibit rooftop antennas upon overall completion of the structure. While less desirable, attic space may need to be designated for the Donor Antenna(s) placement.

- Selection of the specific antenna models for use outside the building structure shall be the responsibility of the Contractor/Designer.
- Antennas shall be high quality, ruggedized models designed for long-term, outdoor use with high-reliability performance and reduced generation of passive intermodulation (PIM)
- Couplers, duplexers, filters, combiners and related hardware utilized outside the building should be designed for long-term, outdoor use with high reliability and minimal PIM.
- Each exterior transmission line shield shall be equipped with a ground kit and connected to an external ground bus bar provide by the Contractor. JMU, for existing buildings, and the General Contractor, for new construction, will provide the ground conductor and the Contractor shall attach securely to this ground bus bar.
- External DAS or BDA antennas shall be protected from lightning and static discharges with an appropriate Transient Voltage Surge Suppression (TVSS) device.
- All exterior mounting hardware shall be of steel and hot-dipped galvanized. Grounding hardware shall be stainless steel with copper conductors as appropriate.
- Samples of the exterior antennas and mounting options chosen for the DAS must be presented to JMU IT Telecom personnel managing the project prior to approval being given for the project design.
- Antennas, cabling and mounting hardware proposed for areas accessible by the public shall be tamper-proof and protected from easy manipulation and/or damage.
- UHF band donor antennas:
 - Minimum 50 ohm, Omni, Yagi or log-periodic type.
 - Minimum gain of 6 dBm over 450-470 MHz.
- Outdoor donor antenna: 800 MHz Trunked public safety donor:
 - Minimum 50ohm, Yagi or log-periodic type.
 - Applicable gain for 806 to 862 MHz and intended purpose of the system.
 - Heavy aluminum or stainless construction; Directional elements shall be mounted to the boom through holes through the center line of the boom and welded in place or pinned in place with stainless steel fasteners.

Exterior Cabling and Fittings:

- Cable routing will be coordinated with JMU Telecom and JMU FM Engineers to identify and utilize proposed and/or existing pathways within a structure that take into consideration the specific needs of this project and the potential needs for future projects when considering pathway, junctions, size and access portals to conduits. [REF: NFPA 70, 312.5(A-C)] and [REF: NFPA 1221, 5 (Applicable Sections)]
- All Cabling will need to be neat, hidden out of sight in open ceiling systems, structural framing, poles, conduits, wire molding or raceways such that it is reasonably protected, aesthetically acceptable or blends with surroundings and not easily accessible to the general public as approved by the University.
- All Wiring on the Exterior of the Structure, Conductors and Fiber-optic cables shall be installed in accordance with NFPA 70 in any one of the following wiring methods [REF: NFPA 1221, 5.5.2]:
 - Electrical Metallic Tubing
 - Intermediate Metal Conduit
 - Rigid Metal Conduit
 - Surface Metal Raceways
 - Rigid Polyvinyl Chloride Conduit only if specifically, pre-approved by AHJ [REF: NFPA 1221, 5.5.2.1]
- Coax cable from donor antennas to repeater should be:
 - Black UV rated outer jacket.
 - (UL) **CMP** or (NEC) **MPP** rated outer jacket (Meeting CSA FT6 Flame Test Requirements).
 - 1/2" or .400" nominal industry size or appropriately sized cabling.
 - Use a single corrugated outer conductor, or a combination braid + conductive tape outer conductor.
 - Have a specified loss per 100' not exceeding 2.9 dB at 450 MHz.
- Coaxial Jumpers:

- Coax type: Preferred RG142 or other double shielded coax type that is size equivalent to RG-58. Contractor/Designer may suggest alternates if engineering design identifies better potential solution.
- See section on indoor antennas for jumpers from DAS to indoor antennas.
- Coax connectors:
 - 50-ohm impedance, .400" or 7/8" nominal industry size or appropriately sized cabling to match the coax size on which the connector is mounted.
 - Connectors used in the system must meet the performance standards equivalent to or greater than an N-Type connector.
 - Connector mounting:
 - For corrugated outer conductor coax, use threaded front and back, shell type connectors designed for automatic flare-and-clamp field assembly design.
 - High Quality Matching Connectors that match the coax type required. Crimp style connectors are not acceptable.
- Passivated stainless steel or silver-plated outer shell.
- Gold plated captivated center conductor.
- Manufacturer shall match to coax on which the connector is mounted. Coax type and connector type shall be specified by that manufacturer as made for each other.
- Connector type is to be N type unless noted otherwise for the indoor antennas.
- All external cables shall be UV and weatherproof rated as well as connectors exterior rated and properly wrapped and weatherproof sealed.
- All cabling shall be secured using UV rated, weatherproof straps, ties, and/or tape materials.

System Power, UPS Backup and Automatic Emergency Generator

- All electrical outlets supplying power to radio communications equipment that are connected to Emergency Generator circuits shall be RED in color and labeled to identify the respective breaker box and circuit number that controls that outlet.
- All BDA/DAS Systems shall be installed on circuits supported by Automatic Building Emergency Generator Power to maintain Controller/Repeater during domestic power outages when available.
- If multiple Generators are present BDA/DAS Systems shall be connected with Emergency Generators designated and labelled specifically for Telecom, Emergency Notification, and Communications Services.
- Where an Automatic Emergency Generator Power Transfer Switch is present a UPS system shall be installed that provides **at least 3 hours** of uninterrupted electrical power to all communications devices until the automatic transfer switch fully engages to provide stabilized Emergency Generator electrical supply or until the power can be manually transferred in the event of an automatic transfer switch failure as approved by AHJ. [REF: NFPA 1221, 4.7.8]
- Dedicated Stand-alone UPS options shall be used if Automatic Building Emergency Generator Power circuits are not available. These UPS Systems shall also include battery backup for all electronic devices capable of supporting normal communications usage for a period of **24 hours** in accordance with NFPA standards
- Power loss, power restoration, surges, sags and/or brownouts shall not alter the unit's operating parameters. The unit shall remain fully operational when supplied power is within the specification of its design. The unit shall automatically recover within a maximum of **90 seconds** after experiencing any of the aforementioned occurrences. [REF: NFPA 110 Generators & Emergency Standby Power]
- Stand Alone UPS Battery Enclosures should be NEMA-3R Complaint or higher.

Grounding, Lightning & Power Surge Protection

- Equipment shall be properly grounded.
- Care shall be taken to minimize the length of the connection to the internal ground bus and sharp bends in the ground lead shall be avoided.
- All Interior electronic equipment racks and chassis shall be connected to the internal building grounding bus using copper wire.

- All ground wire shall be #6 Gauge Wire or heavier with non-ferrous compressive connectors or crimp on lugs on each end.
- Ground connections to structure must be clean, bare metal, and to surfaces that are treated with a conductive paste prior to attachment of the ground lug.
- Circuit Protection shall be in accordance with NFPA 70 and NFPA 1221, 5.6 (Applicable Sections).
- Surge suppression devices should be provided for all active components.
 - This includes but is not limited to the Main repeater ground and any added donor coax surge suppressor at the main repeater.
 - Donor coax surge suppressor ground in each donor coax line must be installed and grounded within 10' of the building entry of the coax.
- Exterior Ground connections may be compressive grounds, or CadWeld grounds. Appropriate precautions for the use of the CadWeld process must be taken to prevent burning or excessive smoke.
- The following Exterior grounding must be performed:
 - Donor antenna mast ground; Earth ground is preferred but this mast ground path can be to structure if earth ground isn't readily available. (Requires approval from JMU ITT)
 - Connections:
 - Any compressive or other mechanical exterior ground connection must be treated with a ground paste prior to ground installation, and then covered with a protective layer of Butyl followed by a covering layer of vinyl electrical tape. Caulk protection is not acceptable.
 - The ground connection to the mast may alternatively be a CadWeld ground to the mast and a #2 Gauge solid ground wire or a pipe grounding ring connection and #6 Gauge stranded wire.
 - Compressive grounding to an aluminum ground ring cable must be done with metallurgically appropriate connections and surface treatments that prevent direct contact of the aluminum cable and the copper ground wire, to prevent long term corrosion.
- Exterior coax connection water proofing: Any exterior coax connections must be water proofed with 3 layers. Layer 1 is to be vinyl electrical tape, layer 2 is to be butyl, and the

top layer is to be vinyl electrical tape. All layers shall be applied with even, overlapping wraps of the specified materials. The weather proofing layers must extend over the coax jacket, and onto the surface to which the mating connector is affixed.

System Monitoring:

- Alarm reporting for the DAS and power supply circuit shall be supervised and/or monitored 24/7/365.
- Both the DAS and the Power Supply Systems should be interfaced with the specified fire panel in the building to provide standardized alarms for faults within the DAS or the battery backup or be connected to JMUPD Communications Center where they can be monitored on a separate stand-alone alarm tied to the Universities Central Alarm Monitoring Panel or at minimum via SNMP to JMU Centralized IT Management System.
- Alarm capability should support all components within the DAS system. Design and performance shall comply with NFPA 72, 24.5.2.6 (System Monitoring). Signaling cables shall be supplied, installed and tested by the Contractor.
- BDA/DAS alarms shall include at minimum [REF: NFPA 1221, 9.6.13.1 and NFPA 72, 10]:
 - Donor Antenna Malfunction.
 - Head-end Degradation or Failure.
 - Telco Dialer Circuit Continuity or Failure (For independent direct connect alarms to JMUPD Communications Central Centralized Alarm Monitoring Station that are not connected to an in-building Fire Alarm System that reports to JMUPD and FM Life Safety).
- Power supply alarms shall include at minimum [REF: NFPA 1221, 4.7.8.7 and NFPA 1221, 9.6.12.3 and NFPA 1221, 9.6.13.1]:
 - Source Power Failure (i.e.-Normal Domestic AC Power), Over Voltage, Under Voltage
 - High and Low Battery Voltage
 - UPS in By-pass Mode
 - And failure of the battery charger power and/or low-battery capacity (if required).

- Monitoring zones for all (separately labelled for BOTH UHF 450 and 800 MHz) BDAs and UPS system should provide separate monitored zone outputs with dry pairs pinned and labelled as follows:
 - Pair 1 - Donor Antenna Malfunction
 - Pair 2 - Active RF Device Malfunction
 - Pair 3 - Low Battery Capacity (70%)
 - Pair 4 – System Component Malfunction
 - Pair 5 – Normal AC Power
 - Pair 6 – Loss of Normal AC Power
 - Pair 7 – Battery Charger Failure
 - Pair 8 – Summary Alarm
 - Pair 9 – Donor Antenna Disconnect
 - Pair 10 – Oscillation Alarm
 - Pair 11 – ANN Disconnection
- If DAS monitoring is conducted via the JMU Central Fire Alarm Monitoring System, JMU shall provide alarm connections points through Fire Alarm Vendor to the head-end location from the central panel. This may be done either through a remote sub-panel or through the use of alarm interface modules mounted near the DAS head-end location.
- If DAS monitoring is tied directly to JMUPD Communications Center Centralized Alarm Monitoring Station, then the telco alarm dialer circuit should be monitored and check in periodically on Alarm Panel and indicate an error or trouble alarm if it misses scheduled check-in alarms at least once daily with twice daily preferred consistent with other JMU fire alarm dialer circuit check-ins.
- If DAS monitoring is connected to JMUPD Communications Central Alarm Monitoring Station or other remote monitoring station via a VoIP primary circuit then additional telco circuits and connections may be required (i.e. POTS or CELL circuits) to ensure communications connectivity during potential IP network disruptions or outage and require approval by JMU ITT and AHJ.
- As a JMU POLICY for all JMU Entities, Maintenance Personnel and/or Related Contractors specifically working on JMU BDA/DAS systems. In the event of a malfunction or system maintenance issue that is known to affect the operational capability of an on-line system being reported to them or detected remotely, responding personnel will notify Operational Staff at the following locations immediately of any degraded functionality for first responders and again when full coverage is restored.
 - **JMUPD Communications Center (540-568-6911)**
 - **Harrisonburg/Rockingham Emergency Communications Center (540-434-4436)**
 - **JMU Work Control (540-568-6101)**

Interference:

- System shall be designed as to not interfere with its own equipment or other systems.
- Interference in this case is defined as a degradation of effective receive performance 1 dB or greater. Interference includes Passive Intermodulation (PIM), which must be kept 10dB below the noise floor of all co-located receivers. Special attention shall be given to locations having co-located control or base stations.

Testing and Acceptance:

- There are four types of Testing specified:
 - **System Design Testing** – Performed by the Contractor/Designer and submitted to the JMU PM and JMU ITT to demonstrate projected coverage for approval prior to project initiation or as change orders during completion of project, using iBwave design and signal propagation software.
 - **Commissioning Testing** - Conducted by the Contractor/Designer with results submitted to JMU PM and JMU ITT using iBwave design and signal propagation software with DAS Hardware Designations and Locations WITH and WITHOUT acceptable Grid Overlay in both IBCW/IBX file formats for validation through inspections and verification performed by JMU FM and JMU ITT in cooperation with JMUPD and AHJ.
 - Hardware Installations will be subject to inspection by JMU PM, JMU ITT and JMU FM Engineering for compliance with this specification.
 - The Contractor/Designer will be required to provide current documentation of the results of their **BER** testing of the as-built system at the time of the system commissioning to JMU ITT for system as-built archives.
 - Test all coax runs after connectors have been installed for return loss to the following specification:
 - -25 dB return loss or lower across the frequency band of 450 to 862 MHz, with a precision 50 ohm load terminating the coax under test at the far end of each coax tested
 - Tabulate test results and plots for submission for approval.
 - Tune repeater for gain and channel and filter bandwidth settings. For 800 MHz frequencies, narrowband, minimal delay filter mode is to be employed;

filter bandwidth is to be 50 kHz, 31 second delay. Narrow bandwidths shall be used for UHF as well. Determine and install any uplink overload attenuators beyond any shown on the drawings to avoid uplink front end overload (-30 dBm peak uplink signals into repeater). Document all settings for submittal as part of the maintenance baseline document. Note that particular care needs to be taken to not radiate excess uplink noise back to the 800 MHz BTS site. Uplink noise figure of the BTS from this repeater shall be increased by 0dB as required by the AHJ. The use of the uplink muting feature in the repeater may be required.

- Measure and record isolation between indoor antennas and outdoor antenna for both UHF and 800 MHz bands. The system deployment must meet the isolation requirements as defined by NFPA 1221 (2016) and IFC 810. These publications require the isolation to be 20dB + total system gain as a minimum. For example, if a final system gain setting is 80dB, the measured isolation from the donor antenna to the inbuilding services antennas must be 20dB + 80dB = **100dB total**. Recorded measurements and testing methodology shall be provided as part of the system testing and As-Built documentation.
- Record input spectrum from donor antenna on spectrum analyzer showing at least one channel in the active state in both UHF and 800 MHz systems, to show input downlink power levels. Use the spectrum analyzer on Max Hold for at least 30 minutes to detect any other strong potential interfering signals coming in from the donor antennas. (Cellular signals in the 862-894 MHz range are of particular concern and must be documented.) Document for submittal as part of the maintenance baseline document.
- Record repeater downlink output spectrum on spectrum analyzer showing at least one Harrisonburg-Rockingham County system channel in the active state, to show output downlink power levels. Document for submittal as part of the maintenance baseline document.
- Call quality tests must be met with the final system gain settings.
 - If settings are changed after the call quality tests by more than 3 dB (to meet 800 MHz base site noise figure requirement as an example), then the call quality ATP must be repeated.
- Downlink Coverage Levels - The facility shall be tested for coverage levels and to insure proper system settings and connections as follows:
 - A test antenna and spectrum analyzer shall be used to measure control channel power radiated from each of the system's indoor antennas for the

800 MHz system. The test antenna brand/model must be documented, and may be a test antenna with known gain, or the same antenna as specified for indoor omnidirectional antennas in this specification and is to be connected to the spectrum analyzer input via short jumper with loss of < 0.5 dB at 850 MHz.

- For indoor system antennas within 10' of the floor level, the test antenna shall be placed in as clear an area as possible at distance of 10' +/- 1' from the system antenna under test, and as close to the same horizontal plane as the antenna under test, and no more than 3' below the antenna under test. The level of the control channel on the spectrum analyzer shall be recorded.
 - For indoor system antennas that are more than 10' above the floor, make the measurement at a location where the test antenna is within the specified vertical beam width of the antenna under test. Record both the spectrum analyzer reading and the horizontal distance between the test antenna and the system antenna under test. Note the test location in sufficient detail so that the test can be repeated as part of maintenance measurements.
 - Care must be taken in spectrum analyzer bandwidth, detection, and sweep speed settings, as well as test antenna polarization, to ensure that the digital control channel levels are accurately displayed. 'Max hold' shall be used for recording the levels in systems that do not employ a control channel.
 - These spectrum analyzer results must be compared with the computed EIRP from the systems antennas plus computed distance loss. Any deviation more than +/- 10 dB requires investigation as to the cause, and rectification of any problems found. Any antenna requiring fixes to meet this requirement must be re-tested after any repairs.
 - These spectrum analyzer test results, along with the computed EIRP's from each antenna, are to be submitted as part of the final documentation. They can be in tabular or building plan view format. Note any non-standard test locations in sufficient detail so that the test can be repeated as part of maintenance measurements.
- Interferer and Repeater Filtering Tests:
- Provide spectrum analyzer readings for the main repeater output in the downlink direction, showing any strong in-band signals that are not part of the JMU UHF system or the Harrisonburg-Rockingham County Regional 800 MHz trunked system. For the UHF band, use of Max Hold for at least 30 minutes during the hours of 8 AM to 5 PM local time may be required for this test. For the 800 MHz band, you may be required to show the frequency

range of 851-894 MHz for at least 30 minutes in the same time period. A coupler on the repeater output may be used to prevent spectrum analyzer damage; the value of any such coupler used must be documented.

- Use of the repeaters internal spectrum analyzer function is not acceptable for these tests. However, such plots can be included as supplementary information.
- Uplink Noise Figure Checks for 800 MHz Base Station sites.
 - Confirmation from the AHJ must be received that no excess increase in uplink noise figure at the base station sites is being received after this DAS is put into operation. Increase is to be 0dB as required by the AHJ. ATP call quality tests must be met with the final uplink gain settings.
- **Acceptance Testing** – Performed by JMU ITT, JMUPD, and the AHJ to be approved by JMU ITT, AHJ & VSFM with documentation provided by Contractor/Designer and JMU PM.
 - Contractor shall coordinate testing with the Project Manager, JMU IT Telecom, JMU Police & Safety, and Local Public Safety Providers (AHJ) including HRECC to ensure acceptable coverage and delivered audio quality to UHF & 800 MHz System Users that operate within the coverage area.
 - JMU ITT may utilize their PCTel SeeGull IBFlex RF Scanner when available to test and document DAS coverage and signal strength in facility and/or manually perform Call Quality Tests as necessary to verify coverage area and actual signal strength meets established levels and Delivered Audio Quality specifications for acceptance by JMU and AHJ.
 - Call Quality Tests are to be conducted as follows:
 - Call Quality tests are to be conducted in all areas of the facility.
 - Most areas are to be tested as grid areas.
 - Critical individual spaces smaller than the grid size but larger than closets, are to be tested individually.
 - Testing may be done by individual room if their size and usage dictates and/or if building design makes it necessary to document specific room coverage.
 - Side halls (<20' long) may be tested as part of the grid.

- Grid tested areas: Test point number and location.
 - Divide the grid tested areas into grid spaces sized 20' x 20' for confined individual office or academic spaces or 50' x 50' for general use open air arenas and parking structures or other pre-approved grid size) Each grid space is to be tested in its approximate center, and the test call within a grid space must exceed AQ 3.4 for the grid space to pass.
 - Call quality of minimum DAQ 3.4 is to be recorded in each test grid area for both 800 MHz and UHF on a DAQ Scale Score rating (i.e. – 3.4 or 4.0).
 - Propagated 800 MHz Signal Strength at each test site should also be recorded in -dBm as indicated on Radios used for testing or Spectrum Analyzer.
- Hallway testing: Test point numbers and locations.
 - Each major connecting hallway is to be tested every 30' along its length. Test in the center of the hall, and each test call at a hall test point must exceed DAQ 3.4 for the location to pass.
- If a call fails in a grid space or individual area, then that grid space or individual area is to be re-tested in the center of smaller areas of approximately 10'x 10' each. The whole grid space or area is to be recorded as failed if this test fails in 2 or more of the 4 quadrants.
- The system passes if the average of 95% or more of the test locations pass at a DAQ 4.0. If the system does not meet the targeted 95% requirement for DAQ 4.0. JMU ITT will have the option of accepting the system if it meets minimum of at least a DAQ 3.4 as required by AHJ, but must sign a letter of variance explaining why DAQ 4.0 was not achieved or JMU ITT may require the contractor to make necessary improvements to the system to achieve the overall DAQ 4.0 as specified in JMU's initial requirements.
- Any calls that do not go through due to a system busy condition are not counted as pass or fail.
- More in depth call quality tests may be required by JMU to be conducted with multiple radios (4) provided by JMU ITT or the AHJ that are in known good operating condition, and that meet specified power output, frequency accuracy, and receive sensitivity, and shall include at least one portable radio operated on-site in the test grid on 800 MHz JMU ADM, a second portable radio on-site in close proximity to the test grid on JMU UHF ADMIN

frequency, a third portable or mobile radio operated off-site operating on 800 MHz JMU ADM and a radio console or remote control station operated from a communications center on the 800 MHz JMU ADM talk group and on UHF JMU ADMIN.

- This methodology will allow the multiple evaluators to test and record DAQ across both bandwidths simultaneously through the established gateway that links the two together.
- Baseline testing should be done on each individual talkgroup/frequency, 800 MHz (JMU ADM) and JMU UHF (ADMIN-R) to ensure that gatewayed DAQ is representative of the DAQ on each talkgroup/frequency if tested individually.
- Contractor/Designer shall work through the JMU PM to provide electronic and hard copies of the Building Plan with Grid Overlay Test Recording Sheets to JMU ITT, JMUPD, AHJ, and VSFM at least 48 hours before the scheduled ATP.
- Building Plan with Grid Overlay Test Recording Sheets shall preferably be formatted and printed on 8.5" x 11" paper sheets as a representation of the corresponding floor plan to include assigned room numbers on the floorplan layer with font and lines printed in medium **(50%) GREY**.
- Multiple sheets per structure level/section are acceptable if the structures size requires blow-up views to be able to clearly record ATP results.
- Grid blocks (representing grid tested spaces sized 20' x 20' for confined individual office or academic spaces or 50' x 50' for general use open air arenas and parking structures or other pre-approved grid size) on the Test Scoring Sheets should be no smaller than ½" x ½" square and consist of outlines and font printed in **RED for grid blocks that encompass any Designated Critical Coverage Areas** and **BLUE for all other grid blocks that encompass General Coverage Areas**.
- Grid blocks shall be numbered sequentially starting in the upper left corner of the sheet and increasing from Left to Right across the rows, and from Top to Bottom as rows continue down the grid overlay on the page.
- Each DAS GRID TEST LOG SHEET will need a Header to include: Building Name; Floor Represented; Grid Numbers Included on this Particular Page; Blank for Evaluators Name; Blank for Evaluators Location & Method (i.e. - On-site 800 MHz, On-Site UHF, Remote 800 MHz, Remote UHF, JMUPD

Console 800, JMU Stadium Console UHF, etc.) Blank for Date Test Performed.

- Each Evaluator will use the following format to transmit audio starting with the On-Site 800 Evaluator:
 1. "ON-SITE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 2. "ON-SITE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 3. "REMOTE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 4. "REMOTE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 5. "CONSOLE 800 TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 6. "CONSOLE UHF TRANSMITTING, TEST, TEST, X FLOOR, GRID #"
 - Each evaluator will record their overall perceived DAQ quality test results in the specified grid block on their copy of the DAS GRID TEST LOG SHEET which corresponds to the grids on the Building Plan with Grid Overlay in the following format DAQ: 3.4 or 4.0 ; RSSI -dBm MHz Signal Strength 82 or 95, 121, etc.).
 - Any unusual call quality issues other than the prescribed DAQ / RSSI shall be thoroughly documented and reported to JMU PM, JMU ITT and the AHJ with a complete description of the symptoms, test conditions and include any recommended remedial actions that could or should be taken to resolve the issue.
 - JMU ITT and the AHJ may allow alternative testing using RSSI and DAQ results from test TX/RX individually on designated 800 MHz Talkgroups and UHF 450 frequencies or through established system gateways that will link specific frequencies and talkgroups and recorded in JMU ITT's PCTel SeaGull IBflex RF DAS Testing Unit.
- **Annual Maintenance/Warranty Testing** – Performed by the Maintenance Contractor under supervision of JMU ITT.
 - Review any reports of degraded service since last test.
 - Inspect All infrastructure hardware for signs of damage or malfunctions.
 - Inspect All external antennas, cabling and grounds for signs of weathering, deterioration, or damage.
 - Test all UPS batteries to ensure that they hold for prescribed durations, replace as necessary.

- Conduct RSSI – Radio Signal Strength Indicator Testing either with a portable radio or spectrum analyzer in all areas listed as Critical Coverage Areas documenting current RSSI levels and all test locations.
- Do spot testing throughout at least 25% of the remainder of the General Coverage Areas of the structure documenting current RSSI levels and all test locations.
- Conduct Full Grid RSSI level testing on any areas of the structure that may have been modified or had significant changes in usage or equipment present since last Maintenance/Warranty Test was conducted.
- Compare the results of current testing with RSSI documentation from original acceptance testing and last maintenance/warranty testing and/or any JMU ITT PCTel SeaGull IBflex RF DAS Testing Documentation to identify any discrepancies or variations in coverage.
- Use results of testing to identify any areas that need hardware tuning, repair, or upgrades to meet required standards of coverage.
- Document any tuning, repairs, modifications or replacements to the system conducted as a result of this test.
- Submit all documentation including grid testing with DAS Hardware Designations and Locations with Grid Overlay in both iBwave IBCW/IBX and PDF file formats to JMU ITT for DAS System Archive files.

Documentation:

- Contractor/Designer shall provide copies of ALL design related supporting documents and images related to DAS/BDA which will be maintained by JMU IT Telecom with their RF Documentation Files.
- Provide a detailed materials list and inventory of all installed equipment to include: Manufacturer; Model; Serial Number; Installation Date; Physical Address of all equipment to include Room Number or Descriptive Location on within the Interior or on the Exterior of Structure; Specify RX & TX Frequencies tuned to boost. Materials list should also include: JMU Building Name; 911 Street Address, Installing Vendor/Representative Name, Address and Contact Info; Maintenance/Warranty Vendor Name, Address and Contact info.
- Provide labelled digital images of all: Radio Repeaters; Signal Boosters; Different Antennae Types Deployed Internally and Externally; Equipment Cabinets; Roof

Penetrations; Equipment Supporting Battery or UPS Hardware and Equipment Ground Connections.

- Provide comprehensive As-Built Diagrams in MS Visio or another approved format. Should also be included in iBwave IBCW/IBX floorplan files provided to JMU ITT when Commissioning and Acceptance Testing is performed.
- Provide electronic and hard copies of the Building Plans to included DAS Hardware Designations and Locations WITH and WITHOUT acceptable Grid Overlay in both IBCW/IBX and PDF File formats Testing and Recording to JMU ITT as specified in the Commissioning & Acceptance Testing Procedures Section of this policy at least 48 working hours prior to any type of Inspection or Testing.
- Provide supporting Spectrum Analyzer Graph and Report Print Outs from all tests and final inspections performed in electronic PDF format to demonstrate design progression and final as-delivered levels. Signal Strength Propagation coverage maps (i.e. - Heat Maps) shall be kept on file with JMU ITT RF Documentation from original acceptance of the installed system. These may be used for future comparison in the event of signal degradation, system failure, or future system refresh to compare differences or similarities.
- Provide all design propagation maps in electronic PDF format during design and testing phases of the project and shall be kept on file with JMU ITT RF Documentation. These may be pulled out and compared to current RSSI signal strength conditions to see if something has degraded or changed to compare difference or similarities.
- Final acceptance will be granted once the all public safety authorities (JMU & Local AHJ) approve the performance of the DAS for public safety first responders and daily users and JMU accepts the DAS for use with their radio system, all punch list items have been completed and all documentation has been submitted and approved by JMU IT Telecom.

Warranty:

- All equipment furnished, including hardware and software components, shall be fully warranted to be free from defects in material and workmanship for a period of one (1) year from the date of final acceptance.
- Contractor shall be responsible for all warranty activities related to product registration.
- At the end of the warranty period, Contractor shall hand over all warranty related records to JMU

- Costs associated with base warranty and options shall be itemized and included in the pricing section of any design proposals for DAS installations at JMU.

Preventative Maintenance:

- All preventive maintenance necessary for the system and its components shall be performed during the warranty period and during year two through five. This maintenance shall be limited to the hardware, software and firmware furnished by the Contractor.
- Manufacturer-recommended software and firmware updates associated with security, operation or maintenance shall be provided during this period and shall include local and/or remote installation.
- JMU expects such maintenance to be performed at regularly scheduled intervals in accordance with the recommendations of the manufacturer at a minimum. Contractor shall perform the agreed-upon preventive maintenance twice annually during the original warranty period, during the entire life of any active extended maintenance contract with that contractor, or as often as recommended by the manufacturer in accordance with [REF: NFPA 1221, 11.3.9], whichever is more stringent.
- Any potential costs associated with this type of support or service that will be the responsibility of JMU shall be clearly and individually identified in the pricing section of any proposals to provide DAS related Hardware or Services.
- JMU may issue separate Preventative Maintenance & Service Contracts beyond those services covered by initial installation warranty period.

Nuisance Malfunctions and Failures:

- Nuisance malfunctions and/or failures are recurring operational or functional problems that prevent systems and/or equipment from providing the degree of reliability and services specified at the time of procurement or usefulness necessary for JMU operations, or cause JMU to assign significant resources to resolve on three or more occasions, on similar models of equipment. Such problems can be caused by software, firmware or hardware that is faulty or improperly designed, engineered, manufactured, installed or configured. It does not include degraded operation, which could be resolved through additional optimization within the term of the initial contract.

Site Safety & Training:

- Contract BDA/DAS Vendors working On-Site will be required to follow OSHA, JMU Risk Management and General Contractor Safety Guidelines while operating on the campus and complete mandated Safety Training prior to arrival to the job site.
- JMU Project Management will provide Links and/or schedule for all mandatory training for JMU ITT Staff and Vendors performing work in the constructions area. JMU ITT will forward that information to staff and contracted vendors to be completed before they visit or perform any work at the job site.

NFPA Reference List by Subject Matter used to develop policy:

- NFPA 1, 11.10 or 0.3 (DAS Standards)
- NFPA 72, 24.9 (Two-Way Radio Communications Enhancement Systems)
- NFPA 70, 312.5 (Cabinets, Cutout Boxes and Meter Socket Enclosures)
- NFPA 1221, 9.6.2 (Pathway, Risers, Couplings, Survivability)
- NFPA 1221, 9.6.11.2 (Enclosure Standards)
- NFPA 1221 (Standards for Installation, Maintenance and Use of Emergency Services Communications Systems)
- NFPA 1221, 5 (Communications and Signal Wiring)
- NFPA 1221, 9.6.7 (Radio Coverage Areas and Signal Strength DAQ / -dBm)
- NFPA 1221, 9.6.12, NFPA 1, 0.3.6 (Power and Secondary Power Supply standards)
- NFPA 1221 (Status monitoring with regard to the 450 MHz and 800 MHz systems and Power Systems)

Abbreviations and Acronyms:

- **AHJ** - Authority Having Jurisdiction over the Public Safety Radio System
- **ATP** - Acceptance Test Plan
- **BER** - Bit Error Rate
- **BDA** - Bi-Directional Amplifier
- **BOM** - Bill-of-Material
- **BTS** - Base Transceiver Station
- **DAS** - Distributed Antenna System
- **DAQ** - Delivered Auto Quality
- **DL** - Radio Frequency Down Link
- **dBm** - The power ratio in decibels (dB) of the measure power per one milliwatt (mW).
- **FCC** - Federal Communications Commission

- **HRECC** - Harrisonburg/Rockingham Emergency Communications Center
- **JMU FM** - JMU Facilities Management Department
- **JMU ITT** - JMU IT Telecom Department
- **JMU PM** - JMU Project Manager
- **JMUPD** - James Madison University Department of Police & Public Safety
- **LMR** - Land Mobile Radio
- **MTBF** - Mean Time Between Failure
- **NFPA** - National Fire Protection Association
- **PSN** - Public Safety Network
- **REF** - Reference
- **RSSI** - Received Signal Strength Indicator
- **SNIR** - Signal-to-Noise Interference Ratio
- **SOW** - Scope of Work
- **UL** - Radio Frequency Up Link
- **VoIP** - Voice Over Internet Protocol
- **VSFM** - Virginia State Fire Marshall

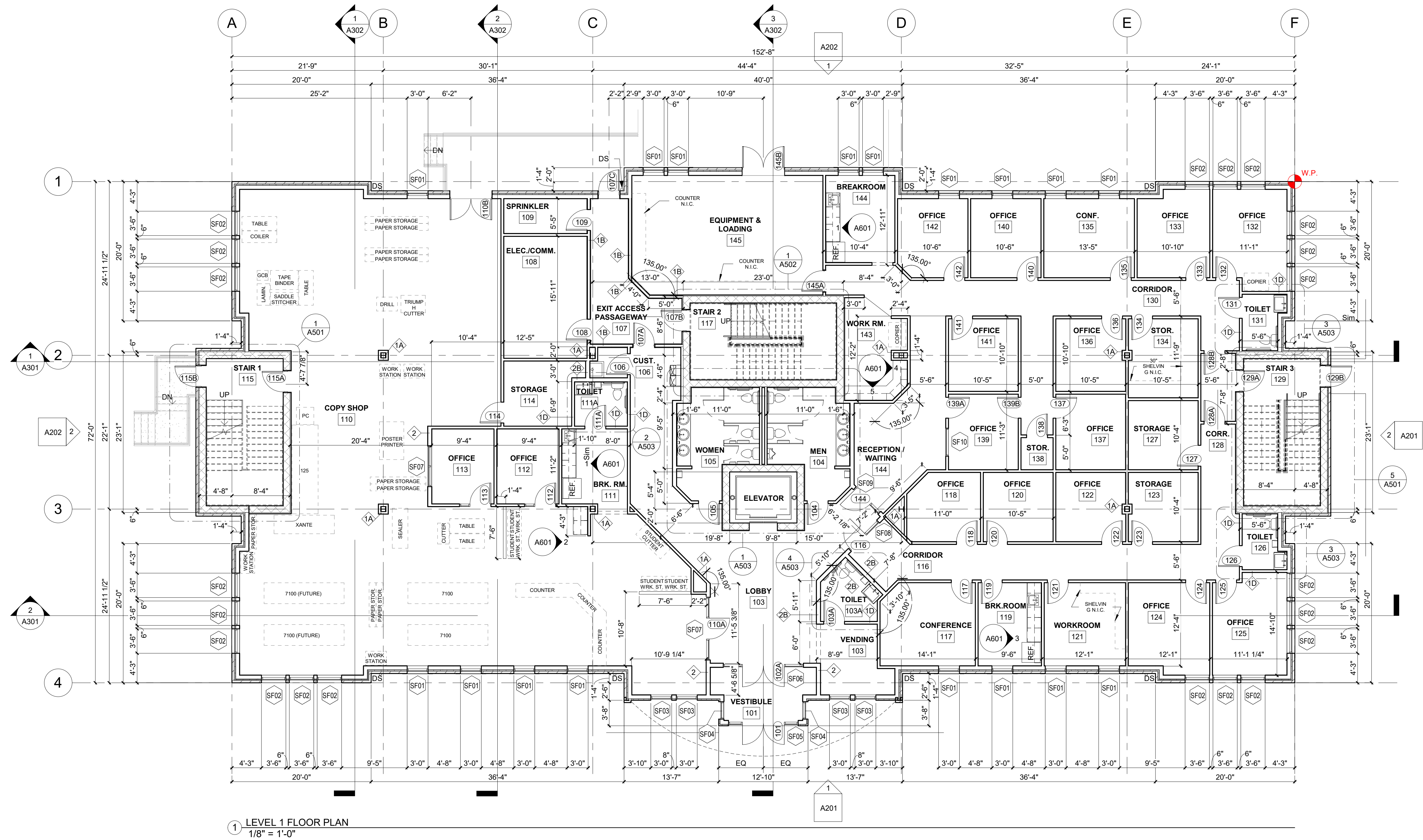
Definitions:

- **Acceptance** - Expressed approval by the Owner or AHJ.
- **Active** - Components that require AC or DC power for operation.
- **Component** - A main system element of the DAS.
- **DAQ 3.4** - Speech understandable; repetition only rarely required. This term will be applied to both digital and analog voice transmissions.
- **DAQ 4.0** - Speech easily understandable; Little noise or distortion. This term will be applied to both digital and analog voice transmissions.
- **Passive** - Components that do not require AC/DC power for operation.
- **Supplier** - A seller of manufactured products who controls the specifications of a product and warrants the product directly, regardless whether the seller actually manufactures the product directly. A distributor is not a Supplier but an approved Supplier's products may be procured through a distributor.

KBF-1239 Attachment G

GROSS SQUARE FOOTAGE:	
LEVEL 01:	10,597 GSF
LEVEL 02:	9,672 GSF
LEVEL 03:	9,659 GSF
LEVEL 04:	9,668 GSF
TOTAL:	39,596 GSF

FLOOR PLAN GENERAL NOTES:	
1	PREP, REPAIR AND SMOOTH ALL SUBSTRATES AS NEEDED FOR SCHEDULED FLOOR AND WALL FINISHES
2	DO NOT LEAVE ANY SURFACE IN AN UNFINISHED STATE
3	PATCH & REPAIR ALL ADJACENT FINISHES AFTER DEMOLITION
4	NOT ALL FLOOR PLAN KEYED NOTES BELOW APPEAR ON EVERY SHEET
5	PROVIDE FLOOR TRANSITIONS BETWEEN DISSIMILAR FLOOR FINISHES



1 LEVEL 1 FLOOR PLAN
1/8" = 1'-0"

NOT FOR
CONSTRUCTION

PROJ NO: Project
Number

A101
LEVEL 1 FLOOR
PLAN

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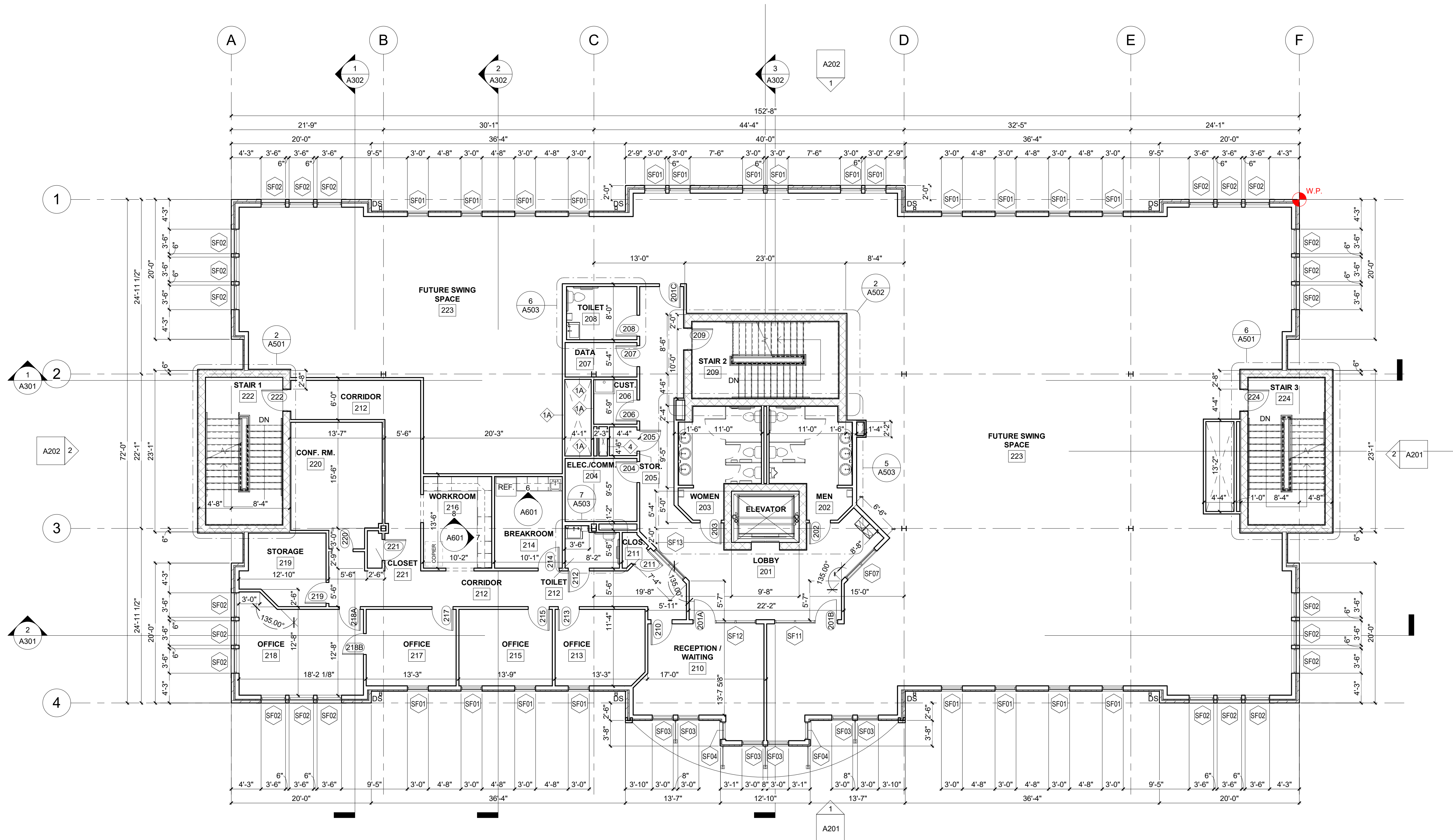
Mark	Date	Description
	3/18/2019	PERMIT DOCUMENTS

GROSS SQUARE FOOTAGE:

LEVEL 01:	10,597 GSF
LEVEL 02:	9,672 GSF
LEVEL 03:	9,659 GSF
LEVEL 04:	9,668 GSF
TOTAL:	39,596 GSF

FLOOR PLAN GENERAL NOTES:

1	PREP, REPAIR AND SMOOTH ALL SUBSTRATES AS NEEDED FOR SCHEDULED FLOOR AND WALL FINISHES
2	DO NOT LEAVE ANY SURFACE IN AN UNFINISHED STATE
3	PATCH & REPAIR ALL ADJACENT FINISHES AFTER DEMOLITION
4	NOT ALL FLOOR PLAN KEYED NOTES BELOW APPEAR ON EVERY SHEET
5	PROVIDE FLOOR TRANSITIONS BETWEEN DISSIMILAR FLOOR FINISHES



1 LEVEL 2 FLOOR PLAN
1/8" = 1'-0"

NOT FOR
CONSTRUCTION

PROJ NO: Project
Number

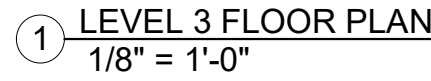
A102
LEVEL 2 FLOOR
PLAN

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Mark	Date	Description
	3/18/2019	PERMIT DOCUMENTS

LEVEL 01:	10,597 GSF
LEVEL 02:	9,672 GSF
LEVEL 03:	9,659 GSF
LEVEL 04:	9,668 GSF
TOTAL:	39,596 GSF

1	PREP, REPAIR AND SMOOTH ALL SUBSTRATES AS NEEDED FOR SCHEDULED FLOOR AND WALL FINISHES
2	DO NOT LEAVE ANY SURFACE IN AN UNFINISHED STATE
3	PATCH & REPAIR ALL ADJACENT FINISHES AFTER DEMOLITION
4	NOT ALL FLOOR PLAN KEYED NOTES BELOW APPEAR ON EVERY SHEET
5	PROVIDE FLOOR TRANSITIONS BETWEEN DISSIMILAR FLOOR FINISHES

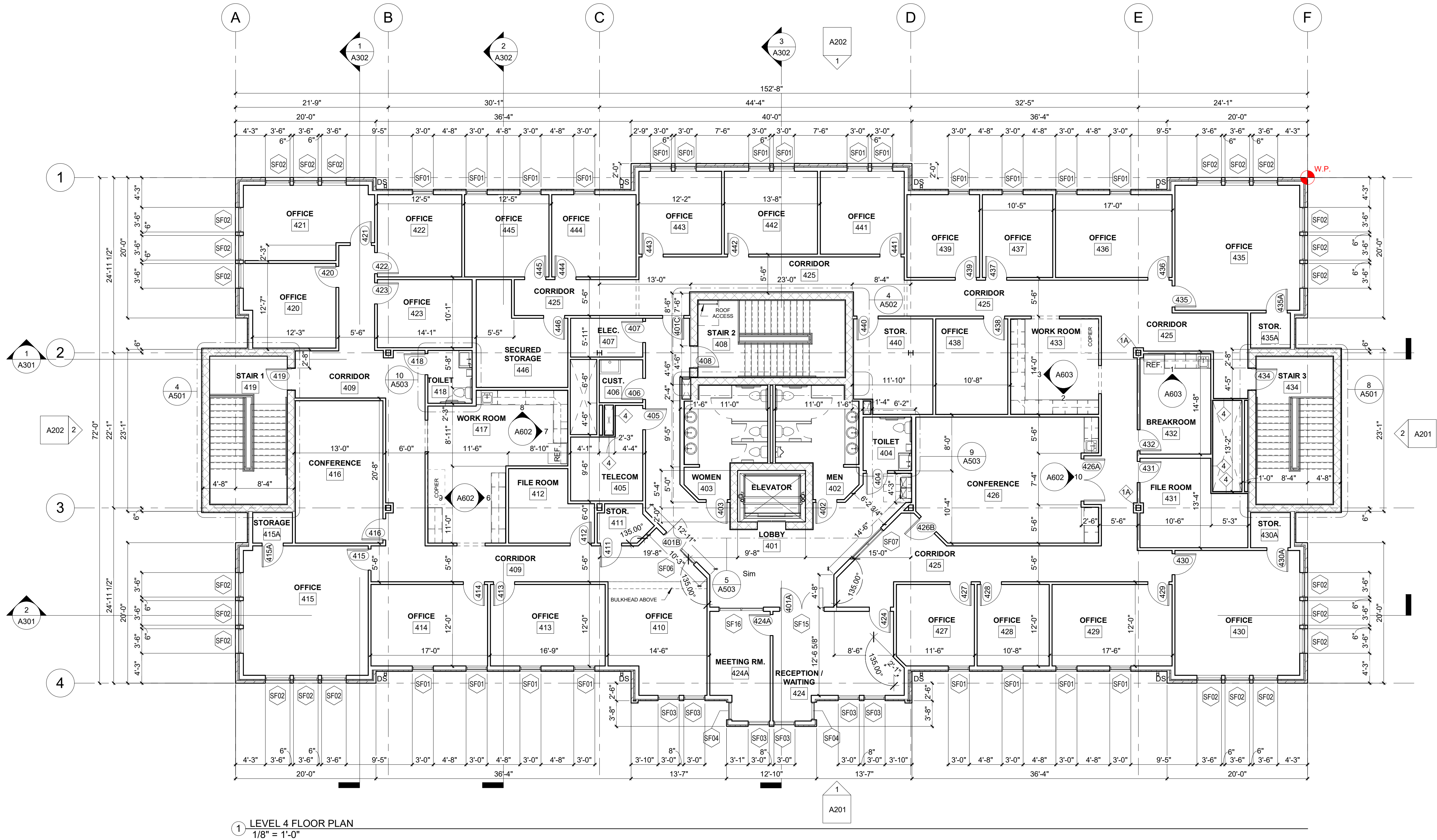


PROJ NO: Project
Number

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GROSS SQUARE FOOTAGE:		FLOOR PLAN GENERAL NOTES:	
LEVEL 01:	10,597 GSF	1	PREP, REPAIR AND SMOOTH ALL SUBSTRATES AS NEEDED FOR SCHEDULED FLOOR AND WALL FINISHES
LEVEL 02:	9,672 GSF	2	DO NOT LEAVE ANY SURFACE IN AN UNFINISHED STATE
LEVEL 03:	9,659 GSF	3	PATCH & REPAIR ALL ADJACENT FINISHES AFTER DEMOLITION
LEVEL 04:	9,668 GSF	4	NOT ALL FLOOR PLAN KEYED NOTES BELOW APPEAR ON EVERY SHEET
TOTAL:	39,596 GSF	5	PROVIDE FLOOR TRANSITIONS BETWEEN DISSIMILAR FLOOR FINISHES



1 LEVEL 4 FLOOR PLAN
1/8" = 1'-0"

NOT FOR
CONSTRUCTION

Mark	Date	Description

PROJ NO: Project Number

A104
LEVEL 4 FLOOR
PLAN

3/28/2019 11:57:26 AM

	A	B	C	D	E	F	G	H
1	DAS SITE NAME	DAS SITE 911 ADDRESS	SYSTEM INSTALLATION DATE	SYSTEM INSTALLER/VENDOR	BDA MAKE / MODEL	DONOR ANTENNA(S) - ON-SITE LOCATION	DONOR ANTENNA(S) - MAKE / MODEL	DAS ANTENNAS - # / FLOOR
2	LAST UPDATED: 2024-07-15							
3								
4	CHBS - College of Health and Behavior Studies	235 Martin Luther King Jr Way Harrisonburg, VA 22807	2016-04-01	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com www.rfdassystems.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 980-279-2388 O: 704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	Westell CSI-61080 80db gain 800 Mhz BDA / [CSI-BDA60180-S8]	Roof Mount on Screen Framing	800 Mhz YAGI / [AY/806-960/14 TW	TBD
5								
6	Chesapeake Avenue Parking Deck	421 Chesapeake Ave Harrisonburg VA 22807	2018-08-20	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com www.rfdassystems.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 980-279-2388 O: 704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	Westell / PS51080 Public Safety Repeater	4 th Floor SW Stairwell on Exterior of East Wall	YAGI	5th - 3 + 1 Yagi * Donor 4th - 3 3rd - 3 2nd - 3 1st - 3 TOTAL COVERAGE ANTENNAS = 15
7								
8	COB - A Section (College of Business Complex - Hartman Hall)	421 Bluestone Dr Harrisonburg, VA 22807	2021-03-24	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com BDA/DESIGN ENGINEER: Danny Billings RF DAS Systems Inc 8230 Trail View Dr Charlotte, NC 28226 P: 704-757-2009 M: 540-520-3606 E: danny.billings@jci.com	- Westell [PS71090] 800 Mhz Bi Directional 90db Public Safety Amplifier with monitoring	Rooftop Mount - On Hartman Hall	800 Mhz YAGI - CSI-AY/806-960/14	Roof Top - 1 Yagi Donor 4th - 2 3rd - 9 2nd - 9 1st - 9 Ground - 3 TOTAL COVERAGE ANTENNAS = 32
9								

	A	B	C	D	E	F	G	H
1	DAS SITE NAME	DAS SITE 911 ADDRESS	SYSTEM INSTALLATION DATE	SYSTEM INSTALLER/VENDOR	BDA MAKE / MODEL	DONOR ANTENNA(S) - ON-SITE LOCATION	DONOR ANTENNA(S) - MAKE / MODEL	DAS ANTENNAS - # / FLOOR
10	COB - B Section (College of Business Complex - Shower Hall)	421 Bluestone Dr Harrisonburg, VA 22807	2020-04-10	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com BDA/DESIGN ENGINEER: Danny Billings RF DAS Systems Inc 8230 Trail View Dr Charlotte, NC 28226 P: 704-757-2009 M: 540-520-3606 E: danny.billings@jci.com	- Westell [PS71090] 800 Mhz Bi Directional 90db Public Safety Amplifier with monitoring	Rooftop Mount - On Showker Hall	800 Mhz YAGI - CSI-AY/806-960/14	Roof Top - 1 Yagi Donor 6th - 4 5th - 4 4th - 4 3rd - 5 2nd - 9 1st - 9 Ground - 3 TOTAL COVERAGE ANTENNAS = 38
11	Duke Hall	820 South Main St Harrisonburg, VA 22807	2013-05-??	Lord & Company Technologies 8809 Sudley Road Manassas, VA 20110-4728 www.lordcotech.com P: 703-361-6009 F: 703-368-8026	TBD	TBD	TBD	TBD
12	Darcus Johnson Hall (Formerly Jackson Hall)	58 Bluestone Dr Harrisonburg, VA 22807	2021-01-19	Lord & Company Technologies 8809 Sudley Road Manassas, VA 20110-4728 www.lordcotech.com P: 703-361-6009 F: 703-368-8026 Mays Electric Service Corporation P.O. Box 11346 Lynchburg, VA	450 - Axell Wireless Digital Channel Selective Repeater MOD# D-CSR 3604 - 8 - 450-470 UHF BDA SER# 800 - Axell Wireless Bi-Directional Amplifier: MOD# BSR-3308-PS-NFPA, Class B SER#	TBD - Attic Azimuth 183 degrees South?	800 Mhz YAGI / (Laird Technologies PC806N - 806-866 Mhz) 450 Mhz YAGI / (Procom R 70-7/h Tetra Band 420-470 Mhz)	Attic - 2 Yagi Donor Upper Level - 0 Main Level - 2 Lower Level - 2 TOTAL COVERAGE ANTENNAS = 4
13	Madison Hall	100 E Grace St Harrisonburg, VA 22807	2016-10-20	Disconnect Reconnect 11325 Random Hills Road, Suite 360 Fairfax, VA 22030 www.disconnectreconnect.com Elton Sayani P: 703-273-4020 M: 551-655-7733 F: 703-273-4035 eltons@disconnectreconnect.com	TX RX Systems Inc / BIRD Signal Booster 1	5th Floor Mechanical Penthouse RM# M5001 - Exterior Wall Mounted Mast.	800 Yagi - Cushcraft PC8010N	5th - 1 Yagi *Donor 4th - 0 3rd - 3 2nd - 0 1st - 12 TOTAL COVERAGE ANTENNAS = 15
14	Mason Street Parking Deck	715 S Mason Street Harrisonburg, VA 22807	2017-01-26	Lord & Company Technologies 8809 Sudley Road Manassas, VA 20110-4728 www.lordcotech.com P: 703-361-6009 F: 703-368-8026	450 - TX RX Systems Inc /BIRD RescueLine - UHF BDA MOD# 61-70-60-A2.0-N SER# 208367-B 800 - TX RX Systems Inc /BIRD RescueLine - 800 BDA MOD# 61-89A-60-A10-N SER# 212372-A	Level 5, 8' pole mounted on East End of Center Structure Knee Wall adjacent to Fire Stand Pipe Connections.	450 Yagi - Procom R 70-7/h 4 element Directional Antenna w/-7 dB Gain [R 70-7/h] 800 Yagi - Cushcraft 806-896 Mhz 6 element Directional Antenna - [PC806N]	5th - 2 Yagi's *Donors 4th - 0 3rd - 4 2nd - 6 1st - 5 TOTAL COVERAGE ANTENNAS = 15
15								
16								
17								
18								

	A	B	C	D	E	F	G	H
1	DAS SITE NAME	DAS SITE 911 ADDRESS	SYSTEM INSTALLATION DATE	SYSTEM INSTALLER/VENDOR	BDA MAKE / MODEL	DONOR ANTENNA(S) - ON-SITE LOCATION	DONOR ANTENNA(S) - MAKE / MODEL	DAS ANTENNAS - # / FLOOR
19	Paul Jennings Residence Hall	831 University Blvd Harrisonburg, VA 22807	2019-08-14	Epitome Networks 4201 Park Place Court Glen Allen, VA 23060 www.epitomenetworks.com P: 804-419-8300 CONTACT/ENGINEER: Sachin Patel - RF Engineer, Wireless Division 1600A E Parham Rd Richmond, VA 23228 M: 704-466-4662 E: Sachin.Patel@epitomewireless.com	*Repeater / Advanced RF Technologies / PSR-VU-9537 (UHF Only) 95 dB Gain Digital Public Safety Repeater - 4.3-10 Female Connectors (UHF Only) (1); *Repeater / Advanced RF Technologies / PSR-78-9533 700/800 MHz Public Safety Digital Repeater (1);	Top of South End Roof Access from 5th Floor, above stairwell.	Telewave / ANT450Y7-WR Telewave, Inc. - 450-470 7dB Yagi (2); CommScope / DB499-A 806-869 MHz 10dB 7 Element Yagi Antenna (1); NOTE: Value: 5 dB in-line attenuation on the UHF donor line. Here are the donor inputs per channel. .2250 = -50.7 dbm .4250 = -57 dbm .6250 = -25.8 dbm .8125 = -41 dbm .9000 = -25.4 dbm	Roof - (2) YAGI UHF 450 + (1) YAGI 800 Mhz 5th - 6 4th - 6 3rd - 6 2nd - 6 1st - 6 TOTAL COVERAGE ANTENNAS = 30
20								
21	Phillips Dining Hall (Dukes Dining Hall)	261 E Grace St Harrisonburg, VA 22807	2020-08-31	Harvester Technologies, LLC 7737 Sharpshooters Ct Manassas, VA 20111 www.harvestercorp.com P: 551-655-7733 info@harvestercorp.com Elton Sayani M: 551-655-7733 elton.sayani@harvestercorp.com	- [PS51080-SNMP] CSI Westel 800 MHz Bi Direction 80 db Public Safety Amplifier / SN# 19RF11020002 - [PSR-VU-9537-X] (ADRF) Advanced RF Technologies Repeater/ (450 MHz UHF) / SN# PVU9537X203001	- 450 Mhz UHF YAGI mounted on rooftop knee wall - 800 Mhz YAGI mounted on rooftop knee wall	450 Yagi - Rooftop knee wall mounted Yagi Antenna 800 Yagi - Rooftop knee wall mounted Yagi Antenna	Roof - 2 YAGI *Donors 3rd - 0 2nd - 4 1st - 6 TOTAL COVERAGE ANTENNAS = 10
22								
23	Sheldon Hall	71 Alumnae Dr Harrisonburg, VA 22807	2021-07-22	Harvester Technologies, LLC 7737 Sharpshooters Ct Manassas, VA 20111 www.harvestercorp.com P: 551-655-7733 info@harvestercorp.com Elton Sayani M: 551-655-7733 elton.sayani@harvestercorp.com	- [PSR-VU--9537-X] ADRF BDA 5 Watt UHF Channelized Digital Repeater - [PSR-78-9553-X] ADRF BDA Channelized Class A Digital Repeater for 800 MHz	- In Attic -- 450 Mhz UHF YAGI mounted on short mast pole and clamped to steel building rafters on East End of open air attic below wood and clay tile roof structure. - In Attic - 800 Mhz YAGI mounted on short mast pole and clamped to steel building rafters on East End of open air attic below wood and clay tile roof structure. (NOTE: Roof penetration was original made with intent to mount above roof line however approval was revoked by JMU Sr Admin for non-compliance with JMU Asthetic Standards. Some pics show original RIGID roof penetration with 4' EMT mast and vent cap up through clay tile. As of 2021-07-29, roof penetration was removed and clay tile replaced.)	450 Yagi - LAIRD Attic mounted Yagi Antenna 800 Yagi - LAIRD Attic mounted Yagi Antenna [	3rd (Attic) - 2 YAGI *Donors 2nd - 0 1st - 5 BSMT - 3 TOTAL COVERAGE ANTENNAS = 8
24								
25								

	A	B	C	D	E	F	G	H
1	DAS SITE NAME	DAS SITE 911 ADDRESS	SYSTEM INSTALLATION DATE	SYSTEM INSTALLER/VENDOR	BDA MAKE / MODEL	DONOR ANTENNA(S) - ON-SITE LOCATION	DONOR ANTENNA(S) - MAKE / MODEL	DAS ANTENNAS - # / FLOOR
26	SSC - Student Success Center	738 S Mason St Harrisonburg, VA 22807	2013-02-19	Lord & Company Technologies 8809 Sudley Road Manassas, VA 20110-4728 www.lordcotech.com P: 703-361-6009 F: 703-368-8026 CONTACT: Bill Cabrera P: 703-361-6009 F: 703-368-8026	CommScope /Andrew MR8018 LRM 800 - 800 MHz	Rooftop Penthouse – 450 Mhz UHF YAGI mounted on West wall of rooftop penthouse, 800 Mhz YAGI mounted on NW corner of rooftop penthouse.	450 Yagi 800 Yagi - [PC806] Cushcraft/Laird Roofmounted Yagi Antenna	Roof - 2 YAGI *Donors 4th - 3 3rd - 0 2nd - 7 1st - 8 BSMT - 1 TOTAL COVERAGE ANTENNAS = 19
27								
28	AUBC - Atlantic Union Bank Center	645 University Blvd Harrisonburg, VA 22801	2020-10-20	RF DAS Systems Inc. / Rock Communications LLC 9111 Ocean Highway East Leland, NC 28451 P: 704-787-2009 F: 704-543-8889 www.rfdassystems.com info@crfdassystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	CommScope Node A+ Multi-Band LRM 450 / LMR 800 Public Safety Repeater	Roof Top/Exterior Wall Mounted YAGI's on NE corner and SE corners	450 Yagi 800 Yagi	Roof - 2 YAGI \$ Donors Catwalk Level - 8 Upper Bowl Level - 2 Concourse Level - 12 Mezzanine Level - 1 Event Level - 10 TOTAL COVERAGE ANTENNAS = 33
29								
30	UREC	701 Driver Dr Harrisonburg, VA 22807	2014-11-21	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	Westall / Model# 51062-58 / Item# 0501-221-007 / SN# CKJ51442	Roof Top on East Side of New Additions - Access through Meditation Room.	RFI - YB6-61 - Yagi Antenna (?)	Roof - 1 YAGI *Donor 4th - 12 3rd - 13 2nd - 15 1st - 12 TOTAL COVERAGE ANTENNAS = 52
31								
32	USB ANNEX	543 Chesapeake Ave Harrisonburg, VA 22807	2016-11-01 (?)	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	CSI Westall 800 Mhz Bi-directional 80db Public Safety Amplifier / Model# PS51080	South End of building mounted on Exterior Wall as of 2019-05-01. NOTE: Antenna had originally been installed in attic area under metal roof and grounding loop. Causing the system to indicate an oscillation alarm.	800 - Cellular Specialties Inc / [CSI AY/806-960/14] Donor rooftop yagi antenna 698-2700 MHz	Roof/Wall - 1 YAGI * Donor 1st - 3 TOTAL COVERAGE ANTENNAS = 3
33								

	A	B	C	D	E	F	G	H
1	DAS SITE NAME	DAS SITE 911 ADDRESS	SYSTEM INSTALLATION DATE	SYSTEM INSTALLER/VENDOR	BDA MAKE / MODEL	DONOR ANTENNA(S) - ON-SITE LOCATION	DONOR ANTENNA(S) - MAKE / MODEL	DAS ANTENNAS - # / FLOOR
34	West Campus Dining Hall	150 Bluesone Dr Harrisonburg, VA 22807	2019-05-23	Carolina BDA, LLC 9111 Ocean Highway East Leland, NC 28451 www.carolinabda.com info@carolinabdasystems.com CONTACT/TECH: Derron Bone – Director of Operations M: 1-704-787-2009 E: deron.bone@yahoo.com E: deronbone@carolinabdasystems.com	- [PS51080] Westell PS51080 PS-SMR 700/800 Public Safety Amplifier	Roof top	800 - Yagi Antenna	TBD
35	Wilson Hall	951 Madison Dr Harrisonburg, VA 22807	2019-08-14	Epitome Networks 4201 Park Place Court Glen Allen, VA 23060 www.epitomenetworks.com P: 804-419-8300 CONTACT/ENGINEER: Sachin Patel - RF Engineer, Wireless Division 1600A E Parham Rd Richmond, VA 23228 M: 704-466-4662 E: Sachin.Patel@epitomewireless.com	*Repeater / Advanced RF Technologies / PSR-78-9533 700/800 MHz Public Safety Digital Repeater (1); SER# P789533192142	Attic Catwalk area in Cupula - Access through Janitorial Closet on S end of 4th Floor	800 - Yagi - CommScope DB499-A	Attic/Cupula - 1 YAGI *Donor 4th - 0 3rd - 0 2nd - 4 1st - 3 Lower Level - 3 TOTAL COVERAGE ANTENNAS = 10
36								
37	CONVO Center	895 University Blvd Harrisonburg, VA 22807		CorsicoRF				
38								