

Request for Proposal

RFP # LBS-897

Lightning Detection/Prediction System with Alerts

February 11, 2016



College of William and Mary
George Mason University
James Madison University
Old Dominion University
Radford University
The University of Virginia
Virginia Commonwealth University
Virginia Military Institute
Virginia Tech

REQUEST FOR PROPOSAL

RFP # LBS-897

Issue Date: February 11, 2016
Title: Lightning Detection/Prediction System with Alerts
Issuing Agency: Commonwealth of Virginia
James Madison University
Procurement Services MSC 5720
752 Ott Street, Wine Price Bldg.
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 p.m. EST on March 29, 2016 For Furnishing The Services Described Herein.

PRE-PROPOSAL AND SITE VISIT: March 9th, 2016 at 9 a.m EST. Attendance at this pre-proposal is optional but it will be the only opportunity to tour campus with University representatives prior to the RFP closing. **Pre-register** by completing and submitting the registration form on Page 1 of this RFP. See Special Term and Condition "V" (Page 27) for additional information.

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

All Inquiries for Information and Clarification Should Be Directed To: LeeAnne Beatty Smith, Buyer Senior, Procurement Services, smith2lb@jmu.edu 540/568-7523 (Fax) 540/568-7936 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 in Ink)
_____	Name: _____ (Please Print)
_____	Title: _____
Date: _____	Phone: _____
Web Address: _____	Fax #: _____
Email: _____	

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 a bidder or offeror because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment.

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TABLE OF CONTENTS

I. PURPOSE.....	Page	1
II. BACKGROUND	Pages	2-4
III. SMALL, WOMAN-OWNED AND MINORITY PARTICIPATION	Page	4
IV. STATEMENT OF NEEDS.....	Pages	4-13
V. PROPOSAL PREPARATION AND SUBMISSION.....	Pages	14-16
VI. EVALUATION AND AWARD CRITERIA.....	Pages	16-17
VII. GENERAL TERMS AND CONDITIONS.....	Pages	17-23
VIII. SPECIAL TERMS AND CONDITIONS	Pages	23-32
IX. METHOD OF PAYMENT	Pages	32-33
X. PRICING SCHEDULE.....	Page	33
XI. ATTACHMENTS.....	Page	33
A. Offeror Data Sheet		
B. SWaM Utilization Plan		
C. Sample of Standard Contract		
D. James Madison University Design and Construction Guidelines (<i>attached separately</i>)		

OPTIONAL PRE-PROPOSAL CONFERENCE & SITE VISIT REGISTRATION FORM

PRE-REGISTER FOR THE PRE-PROPOSAL CONFERENCE & SITE VISIT BY COMPLETING THIS FORM AND RETURNING TO LEEANNE BEATTY SMITH AT SMITH2LB@JMU.EDU OR BY FAX TO 540-568-7936 BY 5:00 PM ON February 25th, 2016.

RFP NUMBER: **LBS-897**

PROJECT TITLE: **LIGHTNING DETECTION/PREDICTION SYSTEM WITH ALERTS**

CONFERENCE DATE & TIME: **March 9, 2016 @ 9:00 AM EST.**

LOCATION: Wine Price, Room 1001 (<http://www.jmu.edu/directory/buildings/WP.shtml>). Parking passes are available in Procurement Services (*Wine Price Building*). Offerors should plan to arrive early to obtain a parking pass. Parking is available in Cantrell Ave Parking Deck Level 3 (accessible from Ott Street) or Lot N3 off of Martin Luther King, Jr. Way.

AGENDA: A pre-proposal conference will be held to go over key portions of the RFP and to answer questions offerors may have in regards. A site tour will be conducted at the conclusion of the pre-proposal conference. The purpose of the tour will be to show potential offerors the layout of the University, key athletic fields, and the location of the University Recreation Building (UREC). This will be the **ONLY** opportunity for potential offerors to tour campus with JMU representatives prior to the RFP closing.

COMPANY NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: _____ FAX NUMBER: _____

LIST THE NAME, TITLE, AND PHONE NUMBER OF THE INDIVIDUALS WHO WILL BE ATTENDING THE PRE-PROPOSAL CONFERENCE & SITE VISIT. **NOTE: NO FIRM MAY HAVE MORE THAN THREE (3) REPRESENTATIVES PRESENT.**

Name	Title	Phone Number

Number of representatives attending the site tour: _____

Desired site locations: _____

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 a lightning detection/prediction system with alerts for James Madison University (JMU), an agency of the Commonwealth of Virginia. Initial contract shall be for one (1) year with an option to renew for nine (9) additional one-year periods.

II. BACKGROUND

James Madison University (JMU) is a comprehensive public institution in Harrisonburg, Virginia with an enrollment of approximately 20,000 students and 3,000 faculty and staff. There are over 600 individual departments on campus that support seven academic divisions. The University offers over 120 majors, minors, and concentrations. Further information about the University may be found at the following website: <http://www.jmu.edu>.

JMU is committed to the immediate notification of the campus community, without delay, upon confirmation of a significant emergency or dangerous situation involving an immediate threat to the health and safety of students or employees. JMU employs a comprehensive mass-communication system to notify the University community of the existence of an emergency and to provide updates as necessary throughout the duration of an incident. The Department of Public Safety is responsible for maintaining JMU's mass-communication system on campus. Maps of JMU campus can be found at the following locations:

<https://www.jmu.edu/parking/files/parkingmap.pdf>

http://www.jmu.edu/pubsafety/wm_library/2015_Clerymap.pdf

Current Emergency Horns/Sirens/Alarm Systems

Currently, JMU utilizes two (2) separate and distinct systems that produce audible signals to warn students, faculty, staff, and visitors on campus of impending emergency situations or hazardous conditions:

1. **Eaton's Cooper Emergency Notification System (*Madison Alert*)** – the *Madison Alert* horn, siren and public address system can be activated to alert members of the University community of an imminent threat to public safety on campus.

The *Madison Alert* system is composed of several remote nodes and a base station. Each of the remote nodes has a control module, antenna, and speaker set delivering approximately 120 decibels of sound in a toroid of up to a mile in diameter depending on geography and weather conditions. The radio in the control module, in addition to communicating with the base station, also functions as a repeater between the base station and other nodes.

The base station is a Windows XP computer connected to an antenna running Waves 7, the control software for the Cooper Notification System network. The base station sends broadcast signals to each of the nodes which then convert the signal to audio to be played over the speaker set.

The system was installed on JMU's campus in 2007 and has remained largely the same until now. Eaton has released hardware and software upgrades to both the nodes and the base station in that time period. Additionally, last summer Eaton sent JMU end of life notifications for both the base station and associated nodes. Eaton has suggested that JMU replace existing Cooper Notification System equipment by the end of 2018, which includes upgrading the base station that will run Waves 8 control software.

Eaton Cooper Notification System Equipment Locations

- Nodes
 - Memorial Hall
 - Student Success Center (*notated as Constitution Hall & Montpelier Hall on JMU Cleary Map* http://www.jmu.edu/pubsafety/wm_library/2015_Clearymap.pdf)
 - ISAT/CS
 - Dingedine Hall
 - (Zane) Showker Hall
- Base Station
 - Anthony-Seeger Hall

2. **StormGrid Lightning Warning System** - a completely automated system that provides continuous monitoring of weather conditions in proximity to the University's main campus and other close by buildings. When the system detects atmospheric conditions that have a high probability of producing an electrical storm (*lightning*) close to campus the system will activate a series of horns and strobe lights in designated areas on campus. This system was originally very small but has been built out over approximately ten (10) years to include three (3) base stations and several sensor/horn nodes spread across campus.

StormGrid Equipment Locations

- Nodes
 - Memorial Hall
 - UREC East Campus Field
 - University Park (UPARK)
 - University Recreation Center (UREC)
 - Anthony-Seeger Hall
 - ISAT/CS
 - Field Hockey and Track and Field Complex
- Base Station
 - Memorial Hall
 - University Recreation Center (UREC)
 - University Park (UPARK)

JMU Athletics Weather Tracking

JMU Athletics monitors weather conditions in order to ensure safety during sports events. JMU Athletics currently subscribes to Telvent DTN as an online weather resource. Telvent DTN provides athletics administrators with weather alerts and allows JMU to view real time weather radar including lightning radar and future radar. Telvent also provides online meteorologist consultation. JMU Athletics clears the fields and/or pool with lightning strikes within 12 miles of JMU campus.

SMS Text Messaging/Voicemail Notification

The JMU community can register to receive text and voice messages over their cell phones with an email message during an emergency notification. JMU Public Safety uses Eaton's Cooper Notification Roam Secure Alert Network (RSAN) to facilitate this process.

LiveSafe Mobile Application

JMU currently licenses the LiveSafe mobile application as an option for campus users. LiveSafe is a communication platform that facilitates discreet and risk-free bystander intervention by community members through information sharing with campus safety officials. Through a campus safety app installed on iPhone and Android devices, students can report GPS-tagged information with added pictures, video, and audio clips. Safety officials are able to respond to students via a Command Dashboard using a real-time two-way chat, or investigate further using the information submitted to officials.

III. SMALL, WOMAN-OWNED AND MINORITY (SWAM) 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

The contractor shall have available and be able to demonstrate the use and functions of the following components and/or features for a lightning prediction/detection system with alerts to provide coverage for the entire JMU campus. Proposed systems shall:

- offer outdoor alarm/siren/horn equipment and/or integrate with the JMU Eaton Cooper Notification System (*Madison Alert*) currently in use on campus;
- support alerts via text and email.

Describe in detail the manner in which each of the following items are addressed by the system:

A. Application Functionality:

1. Provide a detailed description of the proposed system to include:
 - a. Required and optional software components and associated functionality.
 - b. Required and optional hardware components and associated functionality.
2. Describe how the proposed system uses outdoor alarm/siren/horn alerts. Indicate any outdoor visual alerts that are also present (*strobe lights*).
3. Describe how the proposed system triggers text and email alerts and how these alerts can be configured to University needs.
4. Describe the “ease-of-use” features of the proposed system. Indicate system components that would allow the University to easily train student workers to react and respond to system alerts (*i.e. student lifeguards that are responsible for clearing a pool after lightning detection/prediction alert and knowing when the time period had elapsed and it is safe to allow reentry into the pool*).
5. Describe your understanding of the difference between lightning “prediction” and “detection”

systems. Describe the method by which the proposed system operates.

6. Describe the range for predicting/detecting lightning strikes and available configurations.
7. Describe the reported accuracy and reliability of the proposed system. Describe how you measure accuracy and reliability of the proposed system.
8. Describe an instance of system failure that occurred while a client was using the proposed system and describe the steps that your firm has taken to identify the cause and prevent the failure from occurring again.
9. Describe the administrator control panel/dashboard in great detail including functionality.
 - a. Provide screen shots of different views with descriptions.
 - b. Indicate if lightning strikes are mapped in real time or indicate the time delay.
 - c. Describe if weather maps and forecasts are provided in real time or indicate the time delay
 - d. Describe the systems capability to maintain a countdown from the most recent lightning strikes within designated areas. Indicate how this is communicated to the administrator and/or through the control panel/dashboard.
 - e. Describe how the system communicates the estimated potential for lightning strikes.
 - f. Describe available configurations.
10. Describe the capability of University administrators to access system data via mobile technology. Describe in detail the information that could be accessed.
11. Indicate provisions for client to interact with meteorologist via app, email, phone, etc.

B. Experience and Qualifications:

1. Describe your firm's experience in installing and maintaining the proposed system for an institution similar to James Madison University.
2. Provide the name(s), contact information, and resume(s) of the individual(s) who will act as the primary contact for JMU. Contact information shall include e-mail, cellular phone, and location.
3. Describe your firm's experience in interfacing with mobile apps that would allow notification through automated broadcast messaging to registered users of the app (*e.g. JMU's LiveSafe mobile application*).

C. Installation and Site Plan: Installation plans that include roof penetration shall require performance by a *Licensed Class A Roofing Contractor*. Installation plans that include electrical infrastructure work shall require performance by a *Licensed Class A Electrical Contractor*. All installation and site plans, to include but not limited to roofing modifications, electrical work, and building modifications of any kind, shall be subject to approval and inspection by JMU Engineering. For specific detail and instruction regarding *James Madison University Design and Construction Guidelines* see Attachment D (*attached separately*):

1. Provide details on the installation of proposed lightning detection/prediction hardware and equipment:
 - a. Describe how the proposed lightning detection/prediction hardware and equipment must be mounted or installed onsite.
 - b. Indicate if your firm provides installation services or if a third party service provider is used.
 - c. Specify the qualifications/certifications/licenses of personnel that will be assigned to handle installation.
 - d. Specify University resources that would be required during installation.
2. Provide details on the installation of outdoor alarm/siren/horn hardware and equipment if relevant and the proposed system will not integrate with JMU's existing Eaton Cooper Notification System:
 - a. Describe how the proposed outdoor alarm/siren/horn hardware and equipment must be mounted or installed onsite.
 - b. Indicate if your firm provides installation services or if a third party service provider is used.
 - c. Specify the qualifications/certifications/licenses of personnel that will be assigned to handle installation.
 - d. Specify University resources that would be required during installation.
3. Provide a detailed site plan for the proposed location of all lightning detection/prediction and outdoor alarm/siren/horn hardware and equipment to provide campus-wide coverage for the University. The site plan should include an itemized list of all proposed hardware/equipment, its location on campus, and an explanation of why locations are being proposed. The final approved plan for the location of all equipment shall be mutually agreed to between the University and the contractor.
4. Provide a timeline for all proposed installation.
5. Describe backup capabilities for proposed system during power outages.

D. Application Technology:

1. Describe how the modules function as an integrated whole and detail any limitations in their ability to function independently from other modules.
2. Describe the application security features for data, for each module, and for the system. Describe all row-level security options as well as any field-level encryption available.
3. Describe how menus are used within the system and if menus are customizable and/or configurable. Define what customizable and configurable mean for your application.
4. Describe the extent to which the user can configure or customize all forms, reports, input/output screens, formats, etc. to brand the application for JMU. Define what modifiable, customizable and configurable mean for your application.

5. Describe other customizations available (*Provide cost related to customizations in Section X. Pricing Schedule i.e., hourly and fixed fee*).
6. Describe how configuration and customization will affect future releases of software.
7. Describe workflow functionality included with application and provide a list of any function for which workflow is already built and delivered.
8. Describe how JMU's e-mail systems would be incorporated with your system's operation. (Faculty/Staff – on-premise Exchange and students – Live@Edu).
9. Describe third party e-mailing, if this functionality is part of your solution – what messaging service is utilized by your system? Describe details of how messages look (from, etc.)

E. Reporting:

1. Describe all reporting tools supported and how they integrate with the product. Does application licensing include any of the products?
2. Provide a list of all reports delivered as part of the base product including a short description of each. Also include a sample of several reports for review.
3. Describe reporting output formats available.

F. Services:

1. Describe your training options and include a catalog of training offerings and their associated costs. Response should include differentiation between technical staff and end-user training. (*Offeror should provide all costs related to training in Section X. Pricing Schedule.*)
2. Describe services available from your company and/or partners (*Offeror should provide all costs related to services in Section X. Pricing Schedule*). Services that could be included are:
 - a. Implementation
 - b. Development
 - c. Project Management
 - d. Architecture and Design
 - e. Capacity Planning
 - f. Installation and Configuration
 - g. Performance and Scalability
 - h. Conversion
 - i. Monitoring, administration and upgrades
 - j. Operations metrics

3. Describe the support options available through your company including on-going support of the application. Describe what portions of support to be performed by IT, the customer versus the vendor?
4. If support is provided to end-users directly as part of your services, provide the SLA under which you would operate.

G. General:

1. Describe typical implementation timeline and project plan and include examples of previously used project plans.
2. Provide the lifespan of all proposed hardware/equipment along with the warranty on the proposed hardware and software.
3. Describe your approach to test and production environments including licensing requirements and any additional costs.
4. Describe how product(s) addresses accessibility to ensure the application is accessible to people with disabilities. Describe testing for adherence to accessibility guidelines and standards. Provide documentation of the testing performed and results of that testing including the Web Accessibility and Template Guide (WATG located at <http://www.vadsa.org/watg>).
5. Describe the Help system(s) and how it can be modified.
6. JMU is interested in developing a strategic relationship with the successful vendor. Provide information regarding ideas on how such a relationship can prove mutually beneficial.
7. Describe active user groups and how they function.
8. Describe licensing. If licensing is based on number of users, describe the models used to obtain numbers both for current and future usage.

H. Technical:

1. Provide a detailed diagram of the typical architecture/technical environment required for system. List all protocols and ports used for communications and indicate which components are clients and which are servers and whether the communications are fully, partially, or not all encrypted. Specify any communications paths where unencrypted authentication or other sensitive data are passed. List all third party dependent integration points and data paths including any web content included from or sent to outside parties.
2. Describe the toolset from which your application is derived.
3. Describe hardware and software requirements for proposed system(s) along with any sizing assumptions made to arrive at those requirements.
4. Describe supported server hardware and/or virtualized platforms. Describe support for the following operating systems: Linux, and Windows. If virtualization is supported, what virtualization technologies are supported including what components can be virtualized.
5. Describe support for load balancing and system failover including any and all vendor specific preferences. Also include any vendor specific configuration guides.

6. Describe how scalability is accomplished as the criticality of the system(s) and number of users increase.
7. Describe the system capabilities and options for the backup and restoration of the system components
8. Describe the average client response time for all the various functions of the proposed system.
9. Describe services not available during scheduled upgrades to the system including performing backups, installing new releases, creating reports, etc.
10. Describe any standard and proprietary API's, integration / connection resources, and development languages and tools that extend your toolset.
11. Describe the client operating system and browser requirements for your toolset. List any additional client-side software required for development/management of your toolset. Describe any aspects of your application that do not support the Macintosh. Describe any changes to default browser or client security settings. Describe any functionality loss, installation problems, upgrade problems, or other difficulties if client applications are run using a regular user account.
12. Describe your support for mobile technologies including technology used, distribution method, functionality, integration and development toolset and security.
13. Describe requirements for application servers. Describe specific platform recommendations or requirements for certified configuration (*e.g., WebLogic, and Apache Tomcat*) include either specific application server version or required J2EE version.
14. Describe support for web servers (*i.e. Apache, Weblogic and IIS*).
15. Describe the supported database platforms including versions and include any information on additional features required of the DBMS needed to support the functionality of your system as proposed.
16. Describe your SLA to stay current with versions of software utilized by your product.
17. Provide an overall compatibility matrix of software required to operate your system. As appropriate, and at a minimum, this should include operating systems, drivers, browsers, JDKs, and compilers.
18. Describe support for integration with JMU's existing systems listed in the background statement including pricing, availability of API's, toolkits for creating connectors, available services, etc. Provide a full list of application connectors. Describe any other methods of integration supported.
19. Describe storage including file formats.
20. Describe operational monitoring and reporting capabilities. Include the capabilities for application, content, access, and storage metrics, security and the method for obtaining them (*e.g. command line tools, SNMP, and GUI*).

I. Security:

1. Describe how users and processes are authenticated before gaining access to data and services.

Include authentication between components and between the product and external services. Describe your support for the following:

- a. LDAP/S
 - b. Native AD authentication
 - c. Shibboleth 1 and 2
 - d. Kerberos
 - e. SAML
 - f. Other federated systems
 - g. OpenID
 - h. Any two-factor authentication system
 - i. Certificate-based authentication
 - j. Other
2. If you support LDAP for authentication or authorization, describe use of LDAP(S). List the LDAP(S) servers integrated with product(s). Describe integration and support with LDAP(S) user database for authentication (*Active Directory/OID*) and authorization using attributes/group memberships.
 3. Describe handling access to licensed/copyrighted content where access must be restricted.
 4. Describe your use of authentication credentials and associated attributes, group membership, roles, etc. to make authorization decisions Include method(s) and granularity of authorization of access to data and services (e.g. individual accounts, IP address, unix groups, LDAP groups, Active Directory accounts)
 5. Describe how and where any sensitive data (e.g. credit card, financial data, SSN, FERPA, HIPAA or other legally regulated data) including authentication credentials, is stored on clients, servers, and participating external devices. Is it cryptographically protected? If so, provide details on cryptographic protocols, procedures, and key protection.
 6. Describe auditing and logging capabilities and data. Include the information recorded with each event. For example,
 - a. Successful and failed authentication or bind
 - b. Successful and failed access authorization
 - c. Successful and failed policy change
 7. Describe the effects of auditing and logging on a production implementation. Is the proposed system sized for full audit capability? Describe auditing methodologies and capabilities for managing integrity and change control. Describe elements captured with the audit process.

- a. Describe enterprise audit capabilities
- b. List the events and logs that can be sent to an external syslog server
- c. List the events and logs that cannot be sent to a syslog server

J. Maintenance and Support: Because consistency and stability of the operating environment and rapid correction of system failures are critical to James Madison University, major consideration will be given to the amount and extent of hardware and software maintenance coverage and to the quality of maintenance.

1. Describe annual maintenance and support related to all components of the proposed system.
2. Describe the maintenance philosophy including frequency of updates, approach to completing updates, and model for obtaining them.
3. Describe capabilities for remote support and indicate what access to accounts and systems is required. Describe the locations from which this activity would take place. Describe any maintenance options/tiers and whether they vary in cost by time of day, response time, etc.
4. Describe services that may be required in the normal course of operating the system that are not covered under the maintenance contract.
5. Describe the procedures for obtaining services for all types of maintenance (*e.g., installation of corrective code, enhancements, applicable "escalation" procedures for providing additional assistance in diagnosing a failure that is not resolved in a timely manner to include notification procedures and timing as well as what higher levels of assistance will be made available.*)
6. Describe the nature of any continuing research and development performed by the manufacturer to detect and correct problems in the system design, to improve efficiency, and/or to enhance the capabilities of the system proposed.
7. Describe your approach to security reviews during each phase of the software development lifecycle.
8. Describe the procedures followed in distribution of information to James Madison University pertinent to system problems encountered at other locations along with the solutions to those problems, when such information is relevant to the University's software.
9. Describe procedure for handling upgrades. Specify how often upgrades are made to the application software and how "patches" and "fixes" to the systems are handled. Describe if and how your product impacts our ability to apply security updates in a timely manner to underlying or supporting products (*e.g. Windows, Linux, Java, Oracle, MS Office, Web server*). Timely is defined as no later than 30 days from time of vendor release.
10. Describe the nature of system enhancements in development that are scheduled for release in the next twelve months.
11. Describe all responsibilities of both the contractor and James Madison University in the isolation and diagnosis of system failures.
12. Describe your "escalation" procedure.

K. Hosted Applications: The University occasionally explores opportunities for hosting applications external to the university. If hosting is an option for this project, then complete the following section. If hosting is not an option, there's no requirement to respond.

1. Describe where services and data storage are located geographically.
2. Describe how applications are secured inside your firewall.
3. Describe your approach to applications and how they're hosted on servers. (*Will the JMU application(s) reside on dedicated physical/virtual servers?*) Describe the different levels of security for different application layers.
4. Describe the network layer security you provide.
5. Describe your methodology for handling patches and software updates.
6. Describe your approach to screening employees and the level of experience preferred.
7. Describe how you track attacks. Describe your approach to informing JMU about attacks.
8. Describe the audit and security infrastructure testing process you utilize and the frequency of those audits/tests.
9. Describe your approach to security reviews during each phase of the software development lifecycle.
10. Describe the vulnerability detection and response process surrounding your product and hosting infrastructure. Describe your patch release strategy for problems found.
11. If hosted, provide results of the latest penetration test and vulnerability scan performed on your system.
12. Describe your physical and cyber data center security. Describe what measures are in place to prevent employees from viewing data they are not authorized to see or outsiders from hacking into the system.
13. Describe your approach and policy regarding ownership of customer data that resides in your data center. Describe customer rights and abilities regarding moving and copying. Describe vendor and partner practices related to moving and copying data.
14. Describe any exit strategies you offer.
15. Describe your approach to backups and disaster recovery.

L. Privacy

1. Provide your privacy statement.
2. Identify the type/specific information being collected (*User Data – Anonymous or Personally Identifiable*).
3. Specify who collects the information.

4. Specify why the information is collected.
5. Describe how the information is collected (*explicitly, via Cookies, via Web Bugs, etc...*).
6. Describe how the information is used.
7. Specify how long the information is retained.
8. Describe how the information is stored and kept.
9. Describe how the information is secured.
10. Specify whether you share the information with another party. If information is shared with another party, then respond to Items a. through h. below relative to this information.
 - a. Identify the type/specific information being collected (User Data – Anonymous or Personally Identifiable).
 - b. Specify who collects the information.
 - c. Specify why the information is collected.
 - d. Describe how the information is collected (*explicitly, via Cookies, via Web Bugs, etc...*).
 - e. Describe how the information is used.
 - f. Specify how long the information is retained.
 - g. Describe how the information is stored and kept.
 - h. Describe how the information is secured.
11. Specify whether you collect information on JMU or any party related to JMU from third parties. Respond to Items a. through i. below relative to this information.
 - a. Identify the type/specific information being collected (*User Data – Anonymous or Personally Identifiable*).
 - b. Specify who collects the information.
 - c. Specify why the information is collected.
 - d. Describe how the information is collected (*explicitly, via Cookies, via Web Bugs, etc...*).
 - e. Describe how the information is used.
 - f. Specify how long the information is retained.
 - g. Describe how the information is stored and kept.
 - h. Describe how the information is secured.
 - i. Specify whether you share the information with another party.

12. Specify the transaction information collected/maintained.

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.

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. **One (1) original and eight (8) copies** of the entire proposal, INCLUDING ALL ATTACHMENTS. Any proprietary information should be clearly marked in accordance with 3.f below.
 - b. **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 3.f below.
 - c. Should the proposal contain **proprietary information**, provide **one (1) redacted hard copy** of the proposal and 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.

2. The version of the solicitation issued by JMU Procurement Services as amended by any 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 modifications 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.
3. 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 should 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’ 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 and will result in rejection and return of the proposal.
4. Oral Presentation: Offerors who submits 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 acknowledgments, if any, signed and filled out as required.
2. Plan and methodology for providing the goods/services as described in Section IV “*Statement of Needs*” of this Request for Proposal .
3. Offeror Data Sheet, included as Attachment A to this RFP.
4. 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.
5. 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.
6. 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:

1. Quality of products/services offered and suitability for the intended purposes.
2. Qualifications and experience of Offeror in providing the goods/services.
3. Specific plans or methodology to be used to perform the services.
4. Participation of Small, Women-Owned and Minority (SWAM) Businesses
5. Cost

Allocation of points for evaluation criteria will be published to the eVA the solicitation posting prior to the closing date and time.

- 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.

VII. GENERAL TERMS AND CONDITIONS (Revised 8/18/15 ABS)

- 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 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, 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 bids or 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 subcontractor(s), 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 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 bid or proposal under this solicitation, the bidder or 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 bidder or 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 \$50,000, 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:** A bidder, offeror, or contractor shall not be discriminated against in the solicitation or award of this contract because of race, religion, color, sex, national origin, age, disability, faith-based organizational status, any other basis prohibited by state law relating to discrimination in employment or because the bidder or 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 procurement solution by completing the free eVA Vendor Registration. All bidders or offerors must register in eVA and pay the Vendor Transaction Fees specified below; failure to register will result in the bid/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:

- a. For orders issued July 1, 2014 and after, the Vendor Transaction Fee is:
 - (i) Department of Small Business and Supplier Diversity (SBSD)-certified Small Businesses: 1%, capped at \$500 per order.
 - (ii) Businesses that are not Department of Small Business and Supplier Diversity (SBSD)-certified Small Businesses: 1%, capped at \$1,500 per order.

For orders issued prior to July 1, 2014 the vendor transaction fees can be found at www.eVA.virginia.gov.

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. **BID PRICE CURRENCY:** Unless stated otherwise in the solicitation, bidders/offerors shall state bid/offer prices in US 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. **TAXES:** Sales to the Commonwealth of Virginia are normally exempt from State sales tax. State sales and use tax certificates of exemption, Form ST-12, will be issued upon request. Deliveries against this contract shall usually be free of Federal excise and transportation taxes. The Commonwealth's excise tax exemption registration number is 54-73-0076K.
- Z. **TRANSPORTATION AND PACKAGING:** By submitting their proposal, all offerors certify and warrant that the price offered for FOB destination includes only the actual freight rate costs at the lowest and best rate and is based upon the actual weight of the goods to be shipped. Except as otherwise specified herein, standard commercial packaging, packing and shipping containers shall be used. All shipping containers shall be legibly marked or labeled on the outside with purchase order number, commodity description, and quantity.

VIII. SPECIAL TERMS AND CONDITIONS

- A. **AUDIT:** The Contractor hereby agrees to retain all books, records, systems, 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 Commonwealth of Virginia, 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:** 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 No.	RFP Number	
City, State, Zip Code	RFP Title	

Name of Purchasing Officer: _____

The envelope should be addressed as directed on the title page of the solicitation.

The offeror takes the risk that if the envelope is not marked as described above, it 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 must 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 by Fax to 540/ 568-7936 or 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 42% of its purchases are made from small businesses. This includes discretionary spending in prime contracts and subcontracts. All potential bidders/offers are required to submit a Small Business Subcontracting Plan. Unless the bidder/offers is registered as a Department of Small Business and Supplier Diversity (SBSD)-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 SBSBD-certified small businesses. This shall not exclude SBSBD-certified women-owned and minority-owned businesses when they have received SBSBD small business certification. No bidder/offers 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 Small Business and Supplier Diversity (SBSD) 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 SBSBD 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 Department of Small Business and Supplier Diversity (SBSD) 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 Department of Small Business and Supplier Diversity (SBSD)-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. 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.
- L. 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.
- M. 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,
- N. 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.

- O. 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.
- P. 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).
- Q. ASBESTOS: Whenever and wherever during the course of performing any work under this contract, the contractor discovers the presence of asbestos or suspects that asbestos is present, he shall stop the work immediately, secure the area, notify the building owner and await positive identification of the suspect material. During the downtime in such a case, the contractor shall not disturb any surrounding surfaces but shall protect the area with suitable dust covers. In the event the contractor is delayed due to the discovery of asbestos or suspected asbestos, then a mutually agreed extension of time to perform the work shall be allowed the contractor but without additional compensation due to the time extension.
- R. 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.
- S. 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.
- T. FINAL INSPECTION: At the conclusion of the work, the contractor shall demonstrate to the authorized owners 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.

- U. INSTALLATION: All items must be assembled and set in place, ready for use. All crating and other debris must be removed from the premises.
- V. PREPROPOSAL CONFERENCE and SITE VISIT: An optional preproposal conference and campus site visit will be held on March 9, 2016 at 9:00 am EST at the Wine Price Building, Rm 1001 on JMU's campus. The purpose of this conference is to allow potential offerors an opportunity to present questions and obtain clarification relative to any facet of this solicitation and also to provide offerors with an opportunity to view the layout of the University, key athletic fields, and the location of the University Recreation Building (UREC).

Bring a copy of the solicitation with you. Any changes resulting from this conference will be issued in a written addendum to the solicitation.

IF YOU ARE AN INDIVIDUAL WITH A DISABILITY WITH NEED OF REASONABLE ACCOMMODATIONS TO PARTICIPATE IN THIS ACTIVITY, PLEASE NOTIFY LEEANNE BEATTY SMITH (BUYER) AT 540-568-7523 (PHONE) NO LATER THAN **February 25th, 2016**. INDIVIDUALS WITH HEARING/SPEECH DISABILITY ARE ENCOURAGED TO USE THE VIRGINIA RELAY SERVICE. TDD USERS – 800-828-1120

- W. 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. 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.
- X. 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.
- Y. 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.
- Z. 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.
- AA. 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 bid/proposal.
- BB. 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.

CC. 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.

DD. NONVISUAL ACCESS TO TECHNOLOGY: All information technology which, pursuant to this Agreement, is purchased or upgraded by or for the use of any State agency or institution or political subdivision of the Commonwealth (the "Technology") shall comply with the following nonvisual access standards from the date of purchase or upgrade until the expiration of this Agreement:

1. effective, interactive control and use of the Technology shall be readily achievable by nonvisual means;
2. the Technology equipped for nonvisual access shall be compatible with information technology used by other individuals with whom any blind or visually impaired user of the Technology interacts;
3. nonvisual access technology shall be integrated into any networks used to share communications among employees, program participants or the public; and
4. the technology for nonvisual access shall have the capability of providing equivalent access by nonvisual means to telecommunications or other interconnected network services used by persons who are not blind or visually impaired.

Compliance with the foregoing nonvisual access standards shall not be required if the head of the using agency, institution or political subdivision determines that (i) the Technology is not available with nonvisual access because the essential elements of the Technology are visual and (ii) nonvisual equivalence is not available.

Installation of hardware, software or peripheral devices used for nonvisual access is not required when the Technology is being used exclusively by individuals who are not blind or visually impaired, but applications programs and underlying operating systems (including the format of the data) used for the manipulation and presentation of information shall permit the installation and effective use of nonvisual access software and peripheral devices.

If requested, the Contractor must provide a detailed explanation of how compliance with the foregoing nonvisual access standards is achieved and a validation of concept demonstration.

The requirements of this Paragraph shall be construed to achieve full compliance with the Information Technology Access Act, 2.2-3500 through 2.2-3504 of the *Code of Virginia*.

All information technology which, pursuant to this Agreement, is purchased or upgraded by or for the use of any Commonwealth agency or institution or political subdivision of the Commonwealth (the "Technology") shall comply with Section 508 of the Rehabilitation Act (29 U.S.C. 794d), as amended. If requested, the Contractor must provide a detailed explanation of how compliance with Section 508 of the Rehabilitation Act is achieved and a validation of concept demonstration. (<http://www.section508.gov/>). The requirements of this Paragraph along with the Non-Visual Access

to Technology Clause shall be construed to achieve full compliance with the Information Technology Access Act, §§2.2-3500 through 2.2-3504 of the *Code of Virginia*.

- EE. 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.
- FF. CERTIFICATION TESTING PERIOD - HARDWARE: Equipment ordered herein shall be subject to inspection and a 30-day testing period by the procuring agency. Contractor equipment which is found to not meet the specifications or other requirements of the purchase agreement may be rejected and returned to the vendor at no cost (including return transportation) by the procuring agency. Unless otherwise notified or mutually agreed, acceptance shall become effective at the end of the 30-day testing period. Such acceptance shall not be conclusive of complete conformance in all respects to the contract specifications and other requirements, or the nonexistence of potential latent defects.
- GG. EQUIPMENT ENVIRONMENT: Environmental specifications for any equipment to be delivered under the resulting contract shall be furnished in writing along with the vendor's bid or proposal, should any such requirements be applicable. These specifications must be in sufficient detail to permit all installed equipment to function efficiently from an environmental perspective. Unless otherwise stated in the solicitation, it will be the procuring agency's responsibility to prepare the site at its own expense to meet the environmental specifications provided.
- HH. 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 in operability. The period of in operability shall commence upon initial notification. In the event the equipment or software remains inoperable for more than two (2) 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 (2) days following the request for replacement.
- II. LATEST SOFTWARE VERSION: Any software product(s) provided under the contract shall be the latest version available to the general public as of the due date of this solicitation.
- JJ. NEW EQUIPMENT: Unless otherwise expressly stated in this solicitation, any equipment furnished under the contract shall be new, unused equipment.
- KK. 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.
- LL. PRODUCT SUBSTITUTION: During the term of any contract resulting from this solicitation, the vendor 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.

- MM. 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.
- NN. 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.
- OO. 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.
- PP. SOFTWARE UPGRADES: The Commonwealth shall be entitled to any and all upgraded versions of the software covered in the contract that becomes available from the contractor. The maximum charge for upgrade shall not exceed the total difference between the cost of the Commonwealth's current version and the price the contractor sells or licenses the upgraded software under similar circumstances.
- QQ. SOURCE CODE: In the event the contractor ceases to maintain experienced staff and the resources needed to provide required software maintenance, the Commonwealth shall be entitled to have, use, and duplicate for its own use, a copy of the source code and associated documentation for the software products covered by the contract. Until such time as a complete copy of such material is provided, the Commonwealth shall have exclusive right to possess all physical embodiments of such contractor owned materials. The rights of the Commonwealth in this respect shall survive for a period of twenty years after the expiration or termination of the contract. All lease and royalty fees necessary to support this right are included in the initial license fee as contained in the pricing schedule.
- RR. TERM OF SOFTWARE LICENSE: Unless otherwise stated in the solicitation, the software license(s) identified in the pricing schedule shall be purchased on a perpetual basis and shall continue in perpetuity. However the Commonwealth reserves the right to terminate the license at any time, although the mere expiration or termination of this contract shall not be construed as an intent to terminate the license. All acquired license(s) shall be for use at any computing facilities, on any equipment, by any number of users, and for any purposes for which it is procured. The Commonwealth further reserves the right to transfer all rights under the license to another state agency to which some or all of its functions are transferred.
- SS. THIRD PARTY ACQUISITION OF SOFTWARE: The contractor shall notify the procuring agency in writing should the intellectual property, associated business, or all of its assets be acquired by a third party. The contractor further agrees that the contract's terms and conditions, including any and all license rights and related services, shall not be affected by the acquisition. Prior to completion of the acquisition, the contractor shall obtain, for the Commonwealth's benefit and deliver thereto, the assignee's agreement to fully honor the terms of the contract.

TT. TITLE TO SOFTWARE: By submitting a bid or proposal, the bidder or offeror represents and warrants that it is the sole owner of the software or, if not the owner, that it has received all legally required authorizations from the owner to license the software, has the full power to grant the rights required by this solicitation, and that neither the software nor its use in accordance with the contract will violate or infringe upon any patent, copyright, trade secret, or any other property rights of another person or organization.

UU. 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.

VV. GENERAL CONDITIONS:

1. Contractor shall adhere to the current versions of OSHA regulations, the Virginia Uniform Statewide Building Code (VUSBC), the Construction and Professional Services Manual (CPSM), Virginia environmental regulations and all other incorporated federal and state building codes. **Contractor shall also adhere to the current JMU Design and Construction Guidelines (JMUDCG) for specific guidance on JMU requirements.**
2. Contractor shall adhere to the approved site plan drawings and specifications. Any deviation from these details shall be first addressed by the JMU Project Manager. Construction details recognized as impracticable, or in conflict with any known codes, shall be immediately brought to the attention of the JMU Project Manager.
3. General or primary contractor shall employ reputable sub-contractors, actively engaged in the appropriate trade. The sub-contractors shall have sufficient experience in the commercial construction practices required to complete the project satisfactorily. The general contractor shall not attempt any trade-specific portions of the project, such as mechanical, plumbing or electrical, without the use of qualified technicians under employment.
4. Project manager reserves the right to reject any sub-contractor that the general/primary contractor proposes to use for this project.
5. All accidents and emergencies shall be immediately reported to the Campus Police (540/568-6911) and project manager.
6. Drawings and specifications covering this project shall be studied and arrangements made to avoid conflicts so that the entire system will be installed in the best interests of JMU.
7. All materials and equipment used in this project shall be new, free from defects and shall be installed in accordance with manufacturer's recommendations. Utilize existing fixtures, piping, etc., only where specifically noted on the drawings.
8. Work shall be carefully laid out in advance by arranging items such as chases, openings, and inserts, without any unnecessary cutting of the building. Any damage done to the existing building by the contractor's failure to provide necessary chases, openings and inserts in advance, shall be repaired and made good at the contractor's expense. Completed project shall be uniform in appearance and with no visible patching. No cutting of the existing building shall be done without the project manager's written approval. Clean up any debris created during the cutting and patching operation.
9. Penetrations through the fire resistance rated walls, floors and other assemblies shall be repaired in accordance with the assembly's fire rating and current NFPA standards. All partitions, walls and floors shall be considered as having a minimum of a one (1) hour fire rating.
10. Provide constant protection against rain, wind, cold or heat to prevent damage to existing facilities, new work, materials and equipment.
11. All contractors shall contact project manager and obtain written permission before beginning work.

IX. METHOD OF PAYMENT

The contractor will be paid on the basis of 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 are asking our vendors and suppliers to enroll in the Wells Fargo Bank single use Commercial Card Number process or electronic deposit (ACH) to your bank account so that future payments are made electronically. Contractors signed up for the Wells Fargo Bank single use Commercial Card Number process will receive the benefit of being paid in Net 15 days. Additional information is available online at:

http://www.jmu.edu/acctgserv/expenditures/vendor_pay_methods.shtml

X. PRICING SCHEDULE

The offeror shall provide pricing for all products and services included in proposal indicating one-time and on-going costs.

- A. Provide line item pricing information on all proposed equipment/software including installation.
- B. Provide the maintenance cost for the first year, and, on the basis of an annually renewable contract, the maintenance cost for each of the following nine years.
- C. Provide cost of offered meteorologist services.
- D. Provide all support costs.
- E. Provide initial and ongoing training costs.
- F. Provide all services costs.
- G. Provide the cost of customizations.
- H. Provide all other costs that have not been identified already.
- I. Specify any associated charge card processing fees, if applicable, to be billed to the University.

XI. ATTACHMENTS

Attachment A: Offeror Data Sheet

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

Attachment C: Standard Contract Sample

Attachment D: James Madison University Design and Construction Guidelines (*attached separately*)

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. **CONTRACTOR LICENSE INFORMATION:** The offeror shall insert contractor or subcontractor license number and specialty types:

Licensed Class A Virginia Contractor No. _____ Specialty _____

5. List full names and addresses of Offeror and any branch offices which may be responsible for administering the contract.

6. **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: _____

RETURN OF THIS PAGE IS REQUIRED

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 SBSDD 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: _____
 Listing of Sub-Contractors, to include, Small, Woman Owned and Minority Owned Businesses
 for this Bid/Proposal and Subsequent Contract

 Date Form Completed

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, again with submission of each request for payment)

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: _____

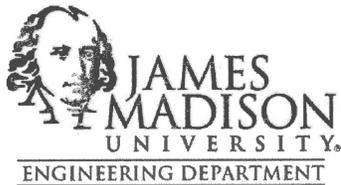
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JAMES MADISON UNIVERSITY



DESIGN AND CONSTRUCTION GUIDELINES



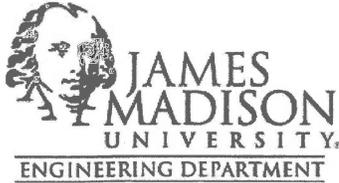
JAMES MADISON UNIVERSITY...

is devoted to building and maintaining the most energy efficient and cost-effective university possible. While keeping the needs of our students and staff first in every respect, we must also consider the weight of our actions on both a local and global scale. Our efforts in reducing overall energy demand and greenhouse gas emissions from the consumption of fossil fuels blend seamlessly with our goal of maximizing the value of all of our facilities. Implementing the best available technologies in every aspect of our building and site design is critical to help us best serve our students, faculty and the local community. The delicate balance between the budget and environmental concerns has led us to develop a campus-wide initiative to reduce our energy consumption. JMU is at the forefront of a far-reaching effort to reduce our overall environmental impact.

Primary attention shall be given to the reduction of energy use and water consumption by focusing on the reduction of the total lifetime building energy load. Since alterations to a building's envelope are generally the most cost-prohibitive, first priority shall be given to all concealed insulation components. Windows and doors are typically the largest contributing factor in the building's heating and cooling load, and quite expensive to replace; therefore providing the most energy efficient and durable fenestration is the next priority for JMU. By focusing on our first two challenges, the impact of the HVAC system, our third critical load component, will be greatly reduced. Air distribution systems, and other HVAC system components that are generally inaccessible, shall be designed with consideration for future, more budget-friendly equipment changes.

As evidenced by our numerous existing campus buildings, we can build our buildings for more than a 100-year life cycle. Knowing that the most efficient use of an older building is the re-use of an older building, we are planning our university for many generations to come. Our university is characterized by many things, one of those being our beautiful campus. As we cherish the history and appeal of our existing Bluestone campus, we want our future generations to embrace the work we do today in the same regard.

Our staff consists of subject matter experts from every branch of the construction industry and we are willing and ready to help improve our campus by every available means.



PURPOSE OF GUIDELINES

The **JAMES MADISON UNIVERSITY** Construction Guidelines (JMUCG) are intended to provide both performance-based and prescriptive guidance to the A/E and the contractor in the planning, preparation and installation phases of all JMU construction projects. This document is also meant to provide instruction as to certain JMU requirements that may go above and beyond typical code requirements. These guidelines are in place to ensure the best possible long-term outcome for JMU by creating sustainable buildings and infrastructure, while maintaining consistency with the current campus-wide design and JMU master plan.

This document DOES NOT supersede applicable state codes, BCOM requirements or any other governing federal, state or local laws. However, this guideline may exclude certain exceptions as listed in the standard codes. Designers are not to reference this guideline in the project specifications, but shall incorporate the contents of this guideline into the building and site design. Any conflict between this document and any of the aforementioned laws or codes shall be brought to the immediate attention of the Director of Facilities Engineering & Construction.

The architect, engineer, designer of record and/or contractor(s) shall be responsible for the entire contents of this document. This document contains the *JMU Design and Construction Guidelines Compliance Form*, and this form shall be filled out, in its entirety, then given to the JMU Project Manager (PM) at the submission of the preliminary construction drawings. Any deviation(s) from these guidelines shall require the exception(s) to be considered through the submission of the *JMU Design Standards Variance Form* that is available from your JMU PM. Variance requests shall provide proof of undue hardship or substantial cost-benefit reasons to be considered by the Director of Facilities Engineering & Construction for approval.

Thank *you* for helping us continue our tradition of excellence at

JAMES MADISON UNIVERSITY.

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TABLE OF CONTENTS

1. General Information
 - 1.1. Codes
 - 1.2. Building & Site Efficiency
 - 1.3. Hot Work & Fire Watch
 - 1.4. Occupied Buildings
 - 1.5. Confined Space
 - 1.6. Inspections
 - 1.7. Clean Air Permit Requirements

2. Architectural Requirements
 - 2.1. Purpose
 - 2.2. Site Design
 - 2.3. Building Design
 - 2.4. Acoustics
 - 2.5. Security Control Rooms
 - 2.6. General Security Classifications
 - 2.7. Exterior Security
 - 2.8. Card Readers
 - 2.9. Custodial Areas
 - 2.10. Equipment Rooms
 - 2.11. Telecommunications Rooms
 - 2.12. Maintenance Rooms
 - 2.13. Laundry Rooms
 - 2.14. Trash/Recycling Rooms
 - 2.15. Loading Areas
 - 2.16. Offices
 - 2.17. Instructional Spaces
 - 2.18. Restrooms
 - 2.19. Lobbies
 - 2.20. MSDS
 - 2.21. Stairs
 - 2.22. Vending Machines
 - 2.23. Bicycle Racks

3. Abatement Procedures
 - 3.1. Scope
 - 3.2. Asbestos
 - 3.3. Lead Paint
 - 3.4. Other Material

4. Site Plan
 - 4.1. General
 - 4.2. Utilities
 - 4.3. Surrounding Areas
 - 4.4. Site Protection
 - 4.5. Lighting
 - 4.6. Construction Trailer

5. Construction Drawings
 - 5.1. General
 - 5.2. "As-Builts"
 - 5.3. Drawing Formats
 - 5.4. CAD Standards
 - 5.5. CAD Drawing Structure
 - 5.6. BIM Standards
 - 5.7. PDF Requirements
 - 5.8. Layering Standards
 - 5.9. AIA Layering Format
 - 5.10. Lines, Objects & Entities
 - 5.11. Scale & Units
 - 5.12. Model & Paper Space Usage
 - 5.13. XREFS
 - 5.14. AutoCAD Drawing Support Files
 - 5.15. File Transmittal
 - 5.16. Record Drawings
 - 5.17. Error-Free AutoCAD Delivery

TABLE OF CONTENTS

6. <u>Parking Lots</u>	
6.1. <u>General</u>	6.3. <u>Heavy Lots</u>
6.2. <u>Standard Lots</u>	6.4. <u>Asphalt Cut & Patch</u>
<hr/>	
7. <u>Landscaping</u>	
7.1. <u>General</u>	7.5. <u>Drainage</u>
7.2. <u>Plantings</u>	7.6. <u>Water Conservation</u>
7.3. <u>Lawns</u>	7.7. <u>Design</u>
7.4. <u>Hydro-Seeding</u>	7.8. <u>Plants to Avoid</u>
<hr/>	
8. <u>E&S Control/Stormwater</u>	
8.1. <u>General</u>	8.3. <u>Project Completion</u>
8.2. <u>Plans</u>	
<hr/>	
9. <u>Excavation & Grading</u>	
9.1. <u>Excavation</u>	9.2. <u>Grading</u>
<hr/>	
10. <u>Utilities Locating</u>	
<hr/>	
11. <u>Irrigation</u>	
11.1. <u>General</u>	11.8. <u>Heads</u>
11.2. <u>Winterization</u>	11.9. <u>Controller</u>
11.3. <u>Piping</u>	11.10. <u>Electrical</u>
11.4. <u>Pipe Installation</u>	11.11. <u>Mapping</u>
11.5. <u>Valve Boxes</u>	11.12. <u>Inspections</u>
11.6. <u>Valves</u>	11.13. <u>Repairs</u>
11.7. <u>Sleeving</u>	
<hr/>	
12. <u>Footings & Foundations</u>	
12.1. <u>Footings</u>	12.2. <u>Foundations</u>
<hr/>	
13. <u>Concrete</u>	
13.1. <u>General</u>	13.5. <u>Placement</u>
13.2. <u>Concrete Mixes</u>	13.6. <u>Interior Slabs</u>
13.3. <u>Formwork</u>	13.7. <u>Sidewalks & Exterior Slabs</u>
13.4. <u>Slump</u>	
<hr/>	
14. <u>Masonry</u>	
14.1. <u>General</u>	14.4. <u>Flashing</u>
14.2. <u>Veneer</u>	14.5. <u>Grout</u>
14.3. <u>Mortar</u>	14.6. <u>Accessories</u>

TABLE OF CONTENTS

15. <u>Bluestone</u>	
15.1. <u>General</u>	15.2. <u>Mortar</u>
<hr/>	
16. <u>Steel</u>	
16.1. <u>General</u>	16.3. <u>Handrails & Guardrails</u>
16.2. <u>Welding & Tensioning</u>	16.4. <u>Stairs & Ladders</u>
<hr/>	
17. <u>Thermal & Moisture</u>	
17.1. <u>Moisture</u>	17.3. <u>Thermal</u>
17.2. <u>Vapor</u>	17.4. <u>Flashing</u>
<hr/>	
18. <u>Fenestration</u>	
18.1. <u>General</u>	18.3. <u>Security</u>
18.2. <u>Hardware</u>	
<hr/>	
19. <u>Roofing</u>	
<hr/>	
20. <u>Life Safety</u>	
20.1. <u>General</u>	20.2. <u>Fire Protection Systems</u>
<hr/>	
21. <u>Building Automation Systems</u>	
21.1. <u>General</u>	21.9. <u>Hardware Requirements</u>
21.2. <u>Quality Assurance</u>	21.10. <u>BAS Controlled HVAC</u>
21.3. <u>Submittals</u>	21.11. <u>Network</u>
21.4. <u>Coordination</u>	21.12. <u>Head End Requirements</u>
21.5. <u>System Operations</u>	21.13. <u>Field Installation</u>
21.6. <u>Operation & Maintenance Data</u>	21.14. <u>VFDs</u>
21.7. <u>Guarantee</u>	21.15. <u>Utility Metering</u>
21.8. <u>Approved Manufacturers</u>	
<hr/>	
22. <u>Mechanical</u>	
22.1. <u>Design</u>	22.10. <u>VAVs</u>
22.2. <u>General</u>	22.11. <u>Exhaust & Make-up Air</u>
22.3. <u>Location & Equipment</u>	22.12. <u>Pumps</u>
22.4. <u>Metering</u>	22.13. <u>Split Systems</u>
22.5. <u>Ventilation & Outdoor Air</u>	22.14. <u>Air Filters</u>
22.6. <u>Water Treatment</u>	22.15. <u>Pipe Insulation</u>
22.7. <u>Cooling Towers</u>	22.16. <u>Refrigeration</u>
22.8. <u>AHUs & RTUs</u>	22.17. <u>Refrigerant Monitors</u>
22.9. <u>Fan Coil Units</u>	22.18. <u>Refrigerant Management</u>

TABLE OF CONTENTS

22.19. <u>Chillers</u>	22.24. <u>Environmental Chambers</u>
22.20. <u>VFDs</u>	22.25. <u>Specialty Systems</u>
22.21. <u>Glycol</u>	22.26. <u>ID of Equipment & Valves</u>
22.22. <u>HVAC Controls</u>	22.27. <u>Identification of Piping</u>
22.23. <u>IT Computer Rooms</u>	22.28. <u>Small Packaged Boilers</u>
<hr/>	
23. <u>Steam</u>	
23.1. <u>General</u>	23.6. <u>Control Valves</u>
23.2. <u>Condensate Pumps</u>	23.7. <u>Underground Piping</u>
23.3. <u>Gaskets</u>	23.8. <u>Humidification</u>
23.4. <u>Heating Water Converters</u>	23.9. <u>Safety Relief Valves</u>
23.5. <u>Flow Meters</u>	23.10. <u>Isolation Valves</u>
<hr/>	
24. <u>Plumbing</u>	
24.1. <u>General</u>	24.4. <u>D/W/V</u>
24.2. <u>Exterior Service</u>	24.5. <u>Valves & Fixtures</u>
24.3. <u>Interior Service</u>	
<hr/>	
25. <u>Electrical</u>	
25.1. <u>General</u>	25.8. <u>Life Safety</u>
25.2. <u>Inspections</u>	25.9. <u>Generators</u>
25.3. <u>Service</u>	25.10. <u>General Lighting</u>
25.4. <u>Branch</u>	25.11. <u>Interior Lighting</u>
25.5. <u>Wiring</u>	25.12. <u>Exterior Lighting</u>
25.6. <u>Exterior</u>	25.13. <u>Classrooms</u>
25.7. <u>Conduit</u>	25.14. <u>Fire Alarms</u>
<hr/>	
26. <u>Conveying Systems</u>	
<hr/>	
27. <u>Telecommunications</u>	
27.1. <u>General</u>	27.9. <u>Emergency Phones</u>
27.2. <u>Building Telecom Entrance</u>	27.10. <u>Junction Boxes</u>
27.3. <u>MDFs & IDFs</u>	27.11. <u>Roof Penetrations</u>
27.4. <u>Work Areas</u>	27.12. <u>Wireless Access Points</u>
27.5. <u>Outlet Boxes</u>	27.13. <u>Classrooms</u>
27.6. <u>Horizontal Distribution System</u>	27.14. <u>Manhole Specifications</u>
27.7. <u>Elevators</u>	27.15. <u>Buried Conduit Specifications</u>
27.8. <u>Grounding</u>	27.16. <u>Completion Documents</u>

TABLE OF CONTENTS

28. Finishes

28.1. Ceilings

28.2. Walls

28.3. Floors

28.4. Paint

29. Wood & Plastics

30. Interior Furnishings

30.1. Furnishings

30.2. Window Coverings

31. Signage

32. JMU Design Standards Variance Form

JMU DESIGN & CONSTRUCTION GUIDELINES COMPLIANCE FORM

RDP/CONTRACTOR COMPLIANCE FORM

JMU Project Name: _____

Project Code #: _____

Consultant/Contractor Firm Name: _____

I, _____ (print name), as the registered design professional(RDP)/contractor of the aforementioned project and the authorized agent for the aforementioned firm, do hereby certify that I have read the *JMU Design and Construction Guidelines* in its entirety and have complied with all requirements therein. This includes all general and specific design principles, as well as any included material and equipment specifications and the listed construction drawing requirements. I also certify that any requirements that are unable to be met, for whatever the reason, have been listed in the *JMU Design Standards Variance Form* and submitted to the designated JMU PM. I also understand that any requests for variance from these guidelines must be first approved by either the JMU Director of Facilities Engineering and Construction or the JMU Director Facilities Planning and Construction before being implemented in the project.

RDP/Contractor Signature: _____

(Please return this completed form to your JMU PM with the submission of the preliminary drawings.)

SECTION 1 - GENERAL INFORMATION

(1) General Information

1.1 Codes

- 1.1.1 The A/E is to adhere to all applicable federal, state and local codes throughout the project.
- 1.1.2 This document may provide code references, exclude certain code-approved exceptions or reference sources outside of the typical code; e.g. VDOT standards, etc.
- 1.1.3 This document does NOT supersede any required codes, to include, but not limited to:
 - 1.1.3.1 The current Virginia Uniform Standard Building Code (VUSBC)
 - 1.1.3.2 The Construction & Professional Services Manual (CPSM)
 - 1.1.3.3 The current National Electrical Code (NEC)
 - 1.1.3.4 All other codes or manuals referenced in any of the aforementioned codes

1.2 Building and Site Efficiency

- 1.2.1 All new construction and renovation shall comply with all current Executive Orders to the extent practicable and where economically justifiable for the university.
- 1.2.2 All efficiency measures shall take into account the total building and site design and incorporate those measures to give JMU the best possible lifetime payback.
- 1.2.3 All building efficiency measures shall take into account the projected maintenance requirements and their associated costs into lifetime building costs.
- 1.2.4 Focus shall be placed on the cost-efficient reduction of energy demand through building envelope design, while incorporating upwards compatibility for future “free-energy devices;” e.g. PV, wind turbines, etc.

1.3 Hot Work and Fire Watch

- 1.3.1 Includes all welding, soldering, cutting, brazing, grinding, drilling or other methods of construction or destruction that can produce a potential fire hazard in the presence of flammable material in an occupied building.
- 1.3.2 All such work shall require a JMU Hot Work permit before work begins.
- 1.3.3 All hot work requires a continuous fire watch that is approved by the JMU office of Risk Management. Fire watch shall also be required in any instance in which a fire suppression system or fire alarm system will be deactivated, modified or limited in its function in any capacity. Certain areas could require an extended fire watch beyond the completion of the hot work.
- 1.3.4 The contractor shall provide a minimum of 48 hours of prior notice to the JMU PM for fire watch request.
- 1.3.5 Comply with JMU Fire Watch procedures.

1.4 Occupied Buildings

- 1.4.1 All work involving occupied buildings or sites shall make primary considerations for the safety of those occupants.
- 1.4.2 Any work in an occupied building that involves a restriction to the accessible route shall provide an alternate accessible route.

SECTION 1 - GENERAL INFORMATION

1.5 Confined Space

1.5.1 All confined space work shall comply with chapter 140 of the Virginia Administrative Code, the "Virginia Confined Space Standard for the Construction Industry."

1.6 Inspections

1.6.1 The JMU Project Manager (PM) will generally perform project inspections, in keeping with regulations as found in the *CPSM*. However, Facilities Engineering will perform additional periodic inspections of projects. These inspections are for code compliance issues. Facilities Engineering personnel are state certified building and trade inspectors.

1.7 Clean Air Permit Requirements

1.7.1 JMU currently operates under a Federal Title V operating permit. This permit classifies JMU as a potentially hazardous air pollutant source and the permit conditions reduce this potential with both practical and federally enforceable measures. Therefore, JMU must closely monitor all stationary polluting equipment that is replaced or installed on JMU property. The submittals and emissions calculations for all such equipment shall be closely reviewed and approved prior to installation, allowing JMU to determine the impact to our current permit. Additionally, all internal combustion engines shall meet the EPA regulations in 40 CFR Parts 40, 85 Standard of Performance for Stationary Compression Ignition Internal Combustion Engines. JMU will be required to submit an Air Permit Application (Form 7) for every piece of stationary polluting equipment that is owned or installed at JMU. This can be submitted as a group for major projects or independently per piece of equipment. The A/E and/or contractor shall submit the required information for all polluting equipment regardless of size. Pollutant sources to be considered are, but not limited to: natural gas, diesel oil, wood, coal or trash.

END OF SECTION 1

(2) ARCHITECTURAL

2.1 Purpose

2.1.1 This section is designed to provide more specific guidance to the designer as to certain detailed requirements for JMU buildings and site work. At the preliminary design phase of any Capital Outlay Project, color boards shall be presented to the JMU Facilities Engineering and Construction Department to be reviewed for the interior and exterior finish materials and their proposed applications. Three (3) copies of the approved color boards are required, one of which will be distributed to the Procurement Office, one to the project committee chair and one to FP&C for record.

2.2 Site Design

- 2.2.1** Building placement shall comply with all applicable master plans, design reviews, fire and service accessibility requirements.
- 2.2.2** All infrastructure and delivery of utilities or services shall be included as an integral part of the project.
- 2.2.3** All loading docks, mechanical equipment and other utilitarian areas shall be designed to fit within the campus context. Screening shall be included in the design of any such element.

2.3 Building Design

- 2.3.1** Design massing and volumes to respect and respond to visually adjacent existing buildings.
- 2.3.2** Design the building to maximize the number of rooms with natural daylight exposure, while minimizing the ratio of surface area of walls and roofs, to the gross building area, to reduce heat loss and/or gain.
- 2.3.3** Design roofs to shed snow, ice, and rain in a controlled manner away from the egress path of building occupants. All entries and exits shall be protected from snowfall by their specific roof design, not by roof or entry level barriers.
- 2.3.4** Pitched roofs with overhangs shall be used wherever practicable for lifetime maintenance and durability reasons.
- 2.3.5** Orient primary egress paths, mechanical intakes and mechanical discharges with respect to prevailing weather patterns. Buffer all entries through the use of vestibules. Shield all mechanical entries from moisture, snow or frost intrusion through the use of orientation and of plenums, freeze proof preheat coils or other means.
- 2.3.6** Cantilevered steel or concrete beams shall be avoided to minimize thermal bridging.
- 2.3.7** All buildings shall be constructed of minimal maintenance materials; e.g. brick, concrete masonry units, precast concrete, etc.
- 2.3.8** Building entries shall utilize airlocks to minimize air and dust intrusion.
- 2.3.9** Building design shall incorporate the use of overhangs and other architectural features to protect exterior walls and openings from the elements wherever practicable.
- 2.3.10** All exposed structural and mechanical elements, beams, columns, rain leaders, etc., that are visible from public areas, shall integrate with the overall building aesthetic. Exposed structural elements shall be used only with the specific prior approval of the Director of Facilities Planning & Construction.

SECTION 2 - ARCHITECTURAL

2.4 Acoustics

- 2.4.1 All renovations and new construction shall be designed to comply with requirements and recommendations of "ANSI/ASA S12.60-2010/Part 1 American National Standard Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools, Part 1: Permanent Schools." A/E shall, by submitting preliminary design documents for approval and again by stamping and signing construction documents, stipulate full compliance of the design and full inclusion of all necessary conformance testing for each and every space in the authorized commissioning plan. Designing to and testing conformance of the performance of building spaces and systems is part of basic design services.
- 2.4.2 Installation of noise-generating devices (telephone, vending machines, etc.) should be avoided on the adjoining walls between any rooms requiring acoustical privacy. Such devices shall not be located in common hallways or corridor areas adjacent to noise sensitive areas.
- 2.4.3 Back-to-back utility installations shall be avoided. Place these installations a minimum of one stud bay apart to minimize sound transmission.
- 2.4.4 Walls at faculty and/or management level staff offices shall extend to floor/ceiling level above.
- 2.4.5 Required acoustical isolation shall extend behind recessed fixtures of any type; e.g. medicine cabinets, fire extinguisher cabinets, electric panels, drinking fountains, bookcases, etc.

2.5 Security Control Rooms

- 2.5.1 Security rooms shall be provided to house and protect the main control equipment for required life safety systems; e.g. fire alarms, security systems, card readers and surveillance/security cameras.
- 2.5.2 There shall be one security room per floor.
- 2.5.3 Each security room shall a minimum of 100ft².
- 2.5.4 There shall be no accessory use of the room permitted without prior approval.
- 2.5.5 The security room on each floor shall be interconnected and vertically aligned with the security room(s) above and below.
- 2.5.6 The interconnection shall be (3) 4" conduit runs not to exceed 25' in length. Each conduit run shall also be provided with no less than one additional pull string that is clearly marked.
- 2.5.7 Each security room shall be provided with two (2) communications outlets.
- 2.5.8 Each security room shall be provided with a minimum of three (3) separate electrical circuits, with each circuit rated at a minimum of 20 amps.
- 2.5.9 All security rooms shall be supplied with emergency lighting and power.

2.6 Security Classifications

- 2.6.1 ***Level One*** (*public and semi-public spaces*) - This classification applies to public spaces with intense traffic and no clear ownership definition; e.g. areas without card access or otherwise locked entry doors, lobbies, unrestricted corridors, vestibules, classrooms, stairs, elevators, public restrooms, food service facilities, bookstores,

SECTION 2 - ARCHITECTURAL

recreational and parking facilities, assembly areas and conference rooms. The following minimum security measures are required for *Level One* spaces:

- 2.6.1.1 Clearly posted hours of operation
 - 2.6.1.2 Well lit entries, lobbies and corridors
 - 2.6.1.3 High visibility into spaces before entering
 - 2.6.1.4 Doors lockable by only JMU maintenance staff or JMU police.
 - 2.6.1.5 Visibility from adjacent occupied spaces
 - 2.6.1.6 Emergency telephones linked to JMU police
 - 2.6.1.7 Easily identifiable and accessible egress paths
 - 2.6.1.8 Fire and smoke alarm systems
- 2.6.2 **Level Two** (private and locked semi-public spaces) - This classification applies to parts of a facility may be secured by locked doors, areas where traffic flow is smaller and more controlled and more valuable equipment and/or risk factors are involved. Examples of private spaces at this level include faculty & staff offices, teaching labs, exercise facilities, health and safety areas, lecture hall preparation areas, projection booths, dark rooms, private toilets, special collection areas, campus operation and maintenance spaces, building mechanical/electrical/telecommunication spaces, etc. In addition to security measures recommended for level one, these areas should include the following:
- 2.6.2.1 Secured doors with inside vandal-proof or pinned hinges and latch guard.
 - 2.6.2.2 Lockable windows.
 - 2.6.2.3 Controlled/programmable keying system.
 - 2.6.2.4 Non-lift sliding windows or doors (if used).
- 2.6.3 **Level Three** (secure spaces)-This level applies to high equipment holding spaces, special collection areas, high exhibit spaces, supply rooms, computer mainframe rooms, special secure areas, confidential file rooms, vaults, etc. The security requirements for these spaces shall be determined on a case by case basis, but as a general rule of thumb, the following shall be considered in addition to all security features noted for levels one and two:
- 2.6.3.1 Motion sensors.
 - 2.6.3.2 Intrusion alarms.
 - 2.6.3.3 Electronic surveillance.
 - 2.6.3.4 Time clock access restrictions.
 - 2.6.3.5 Security guard/patrol intervals.
 - 2.6.3.6 Special ID detection/access system.

2.7 Exterior security

- 2.7.1 The protection of people and vehicles at building exteriors is extremely important. Security at walkways, entries, loading and unloading areas, near ground floor windows, and at building indentations can be significantly enhanced by applying the same principles followed in the design of other public spaces.

2.8 Card Readers

- 2.8.1 In all new and remodeled buildings, install one labeled, 2" empty conduit from building telecommunication room to main electrical room.
- 2.8.2 For all building entrances and computer laboratories, provide a 4" square box, with a single gang plastic ring, served by ¾" conduit to the security control room. Label conduit for use with a future card reader system. Mount boxes on strike side of each entrance. This is in addition to all the required infrastructure for security, resultant emergency existing devices, electric strikes, etc.

2.9 Custodial Areas

- 2.9.1 One custodial closet shall be provided per 10,000ft² of floor area, per story, for every story of new buildings. When multiple closets are required per story, provide a minimum distance of 300' feet between closets.
- 2.9.2 Custodial closets should be located near elevators and restrooms, and centralized among the areas they will serve. Do not locate custodial closets on stairway landings.
- 2.9.3 Entrances to custodial closets through restrooms, mechanical rooms or similar intermediate spaces or vice versa are not permitted.
- 2.9.4 The typical custodial closet floor needs to be a minimum of 80ft² with no less than an 8' dimension in any direction, with a minimum clear ceiling height of 9'.
- 2.9.5 Do not locate the components of any telecommunications, electrical or mechanical systems in custodial closets. Closets shall be dedicated to custodial functions only. Accessory roof hatch access shall be permitted.
- 2.9.6 A large capacity Terrazzo floor sink with stainless steel rim, stainless steel splash protectors, hot, cold and tempered running water and a floor drain shall be provided in each custodial closet. Sinks are best located near the door, and should be positioned so that cleaning machines and equipment can be maneuvered easily and emptied into the sink prior to being refilled. Blocking shall be provided at the wall beside the floor sink for chemical dispenser.
- 2.9.7 Provide shelving on at least 3 walls for a minimum of 15 lineal feet, each with a minimum of a 14" vertical clearance between shelves. Mop hangers, mop racks, hose racks and broom racks shall also be provided. Blocking shall be provided for all shelves and location is to be coordinated with the building owner.
- 2.9.8 In addition to the wet custodial closet, a 120ft² custodial supply storage room shall be provided for each building. This room should be located in proximity to the elevator.
- 2.9.9 In addition to, or in conjunction with the custodial supply storage room, each facility shall be provided with a custodial staff area. This area shall include lockers, a table, chairs, a sink, cabinetry, countertops, at least one receptacle outlet for countertop equipment, a bulletin board and a wall clock. Size and location of the area shall be verified and confirmed by the project manager.
- 2.9.10 Provide a 36" door that opens outward, not to restrict any code-required emergency egress paths.

SECTION 2 - ARCHITECTURAL

2.10 Equipment Rooms

- 2.10.1 At each mechanical, electrical, elevator, substation or penthouse equipment room, provide at least one (1) communications outlet with adjacent 125 volt GFCI duplex outlet.
- 2.10.2 Equipment room layouts shall indicate graphically how servicing, operation and repair clearances are assigned. These graphic representations shall include all necessary carrying beam, crane and/or pick-point locations.
- 2.10.3 Provide a minimum of a 4" housekeeping pad for all floor-mounted equipment.
- 2.10.4 Locate all equipment to provide an ample and clearly defined circulation path for the removal, repair and replacement of equipment. Provide all necessary structural and finish elements needed to allow for the movement of associated devices and equipment.
- 2.10.5 Access to equipment rooms shall be through the use of full height doors and/or direct staircases from the exterior or main corridor. Equipment room egress paths shall be clearly diagrammed on preliminary drawings.
- 2.10.6 Rooms and their access routes shall be designed to allow the largest piece of equipment to be removed and replaced without having to remove any permanent walls or other large, functioning equipment.

2.11 Telecommunication Rooms

- 2.11.1 See Section 27.

2.12 Maintenance Rooms

- 2.12.1 Every new building or major remodel project shall include a maintenance material storage room.
- 2.12.2 Rooms shall be 100ft², with no less than a 7' dimension in any direction and shall have a minimum of a 9' clear ceiling height.
- 2.12.3 Each room shall have a minimum of a 36" wide entry door.
- 2.12.4 Locate the maintenance materials storage room near the service entry.
- 2.12.5 Semi-gloss paint is a minimum wall finish.

2.13 Laundry Rooms

- 2.13.1 Shall be designed so that routine maintenance shall be able to be performed without having to move the unit or any adjacent units.

2.14 Trash and Recycling

- 2.14.1 A recycling room of approximately 100ft² shall be provided in each facility, with no dimension less than 7' allowed in any direction. This room shall be located near the loading/service area.
- 2.14.2 All trash and recycling areas shall be sheltered from the wind and easily accessible by custodial staff. Locations shall consider the unpleasant odors often generated by these spaces. Approved screening is required in all trash collection areas.
- 2.14.3 Provide hot and cold hose bibs with backflow prevention, floor drains and impermeable floor and wall coverings.

SECTION 2 - ARCHITECTURAL

2.15 Loading Areas

- 2.15.1 All new facilities shall be provided with adequate off-street service loading and unloading areas.
- 2.15.2 Loading facilities shall allow the use of multiple scales of delivery. Access shall be provided on grade or with ramps for hand truck or cart deliveries to the loading area.
- 2.15.3 Interior and exterior staging, packaging, unpacking and temporary storage areas for loading and unloading shall be included in all facilities.
- 2.15.4 Truck cargo door loading bays shall provide inflatable air sealing devices to account for varying truck dimensions and provide full weather protection.
- 2.15.5 Truck loading bays shall be 48" above grade and incorporate truck levelers when necessary.
- 2.15.6 One (1) communications outlet shall be placed at the entrance of loading areas for delivery drivers to notify JMU personnel of a delivery.

2.16 Offices

- 2.16.1 Faculty and managerial level staff office areas shall include space and services to allow provisions for a desk, a credenza, a 48" wide lateral file, a 48" square white board and at least 40 linear feet of adjustable shelving.
- 2.16.2 Each office shall have receptacle outlets on every wall.
- 2.16.3 Each office shall have a minimum of two (2) communications outlets, on opposing walls, for each 100ft² of space and one (1) additional communication outlet for each additional 100ft², or portion thereof, for telephone, data and video.

2.17 Instructional Spaces

- 2.17.1 Lighting shall be designed to allow presentation on white boards and projection screens with concurrent note taking and fully lit classroom functions.
- 2.17.2 General-purpose classroom equipment shall include, but not be limited to, the following:
 - 2.17.2.1 Instructor area desk and podium with A/V connection, power and communications outlet
 - 2.17.2.2 Fully-seasoned chalkboards, "smart boards" and/or marker boards
 - 2.17.2.3 Tackable display surfaces
 - 2.17.2.4 Student seating (verify type and orientation on a room-by-room basis)
 - 2.17.2.5 Trash and recycling receptacles near the classroom
 - 2.17.2.6 Motorized retractable projection screen
 - 2.17.2.7 Wall Clock
 - 2.17.2.8 Communications outlets with adjacent power outlets (verify quantities and locations on a room by room basis)
 - 2.17.2.9 Ceiling mounted data/video display unit, associated infrastructure and associated voice augmentation
 - 2.17.2.10 General purpose electrical outlets for both operation and maintenance
 - 2.17.2.11 A minimum of one room in every building shall be provided with distance learning equipment infrastructure. This infrastructure shall include space

SECTION 2 - ARCHITECTURAL

availability, system capability, structural capacity and pathways of cameras, control/operation areas monitors, projection devices, etc.

2.18 Restrooms

- 2.18.1 All new buildings shall have a “companion care” restroom installed on the main egress floor, as well as at least one on alternate floors thereafter.
- 2.18.2 Direct and/or reflected lines of sight into all restrooms shall be broken.
- 2.18.3 A minimum of one (1) GFCI receptacle outlet shall be installed near the sink area in all companion care restrooms. A receptacle shall be considered for other restrooms based on location and intended usage.
- 2.18.4 Lighting shall be provided above all enclosed stalls.
- 2.18.5 All wall mounted fixtures and accessories shall be of stainless steel or have a high quality baked-on finish. Some rooms may require full plywood backing behind sheetrock. Verify each rooms specific requirements with the JMU PM.
- 2.18.6 Provide a lead-free ceramic tile wall covering and/or high-gloss enamel finished wainscoting at a minimum height of 54” above finished floor height in all restrooms.
- 2.18.7 All lavatories, toilets (elongated bowl only) and urinals shall be solid white ceramic. All toilets shall have open-front, heavy plastic seats with self-sustaining, stainless steel hinges.
- 2.18.8 Floors shall be lead-free ceramic tile with dark epoxy grout. An uncoupling membrane shall be provided between the tile and the subfloor.
- 2.18.9 All shower surrounds and toilet partitions shall be fully detailed, providing all fabrication and installation details.
- 2.18.10 All toilet partitions shall be solid plastic.
- 2.18.11 Restrooms, bathrooms and shower areas shall be constructed with watertight floor/wall systems with integral floor drains and shall water-tested by JMU inspector. Waterproofing systems shall be a minimum of 40mil PVC liner or be verified to offer greater protection.
- 2.18.12 Floor drains shall be equipped with passive, self-priming devices.
- 2.18.13 Provide floor mounted toilet fixtures.
- 2.18.14 Sanitary napkin disposal containers shall be provided in all stalls of women’s and companion restrooms.
- 2.18.15 JMU shall supply all soap, toilet tissue, sanitary napkin and paper towel dispensers to be installed by the contractor.
- 2.18.16 Provide ADA compliant baby changing stations in all restrooms adjacent to areas of public assembly, and a minimum of one for both male and female restrooms, per story. The installation of one changing station in companion care restrooms for additional stories may be approved by the JMU PM.

2.19 Lobbies

- 2.19.1 Building egress shall be through centrally located, enclosed and lockable lobby areas.
- 2.19.2 Provide a Terrazzo-floored vestibule at all exterior doors on the story serving the level of exit discharge. All non-recessed floor mats provided by JMU building owner.
- 2.19.3 The building lobby shall contain a building directory and a lockable bulletin board.

SECTION 2 - ARCHITECTURAL

- 2.19.4 Provide terrazzo flooring at all lobbies and, at a minimum, all floor areas serving the main egress path.
- 2.19.5 Egress doors shall be recessed or protected by canopies and wing walls.
- 2.19.6 Provisions shall be made to provide safe and maintenance-friendly access to all lighting fixtures in lobbies, atriums and other such high-ceiling, high-volume spaces.

2.20 MSDS

- 2.20.1 Material Safety Data Sheets (MSDS) for all materials used in the project shall be submitted to the university with the construction documents in accordance with federal regulations.

2.21 Stairs

- 2.21.1 The use of rubber tread covers with integral risers, stringer skirts and/or rubber flooring at landings will be considered for stairs.

2.22 Vending Machines

- 2.22.1 Vending machines shall not be located in corridors. Where vending machines are authorized, the A/E shall design all appropriate power, water, drains and a communications outlet.
- 2.22.2 All vending machines shall be *Energy Star* rated.

2.23 Bicycle Racks

- 2.23.1 Campus racks are being standardized to the "Inverted-U" style. Coordinate with JMU PM as to the space requirements for bicycle racks.
- 2.23.2 Provide bicycle rack space to account for 5% of the peak building or space occupant load.
- 2.23.3 Provide adequate space for bicycle racks within 50' of the main entry door.
- 2.23.4 Coordinate with JMU PM as to whether bicycle racks will be contractor or JMU provided and installed.
- 2.23.5 Whenever possible, provide racks in a covered area and convenient to area bicycle paths.

END OF SECTION 2

(3) ABATEMENT

3.1 Scope

3.1.1 The JMU Facilities Engineering and Construction Department (FE&CD) will always monitor any and all aspects of hazardous waste procedures. The JMU FE&CD will delegate the responsibility of hazardous or other waste inspections and the subsequent provisions for environmental remediation or removal *prior* to any construction in existing or new buildings to either the A/E, the general contractor or to JMU. Hazardous waste removal information will be provided to the A/E throughout the design phase of the project as needed for work performed by JMU. The A/E shall incorporate the following information into the construction drawings of the project:

3.2 Asbestos

3.2.1 "An asbestos inspection was performed and no ACM's were found."

3.2.2 "An asbestos inspection was performed and ACM's were found generally in the areas indicated. However, the work in this project is not intended to disturb the existing ACM's."

3.2.3 "An asbestos inspection was performed and asbestos-containing materials were found generally in the areas indicated. The asbestos survey/inspection report is available to the contractor(s) for his information. The ACM's shall be removed prior to any other work being performed in these areas. The Asbestos Management Plan (AMP) is included in the documents. The asbestos abatement contractor shall mark-up the AMP to show the "as-built" conditions resulting from its work to include the areas where asbestos was abated, the areas where asbestos was encapsulated and the areas where ACM's exist, but were left in place."

3.2.4 "An asbestos inspection was performed and ACM's were found generally in the areas indicated. The asbestos survey/inspection report and the AMP area available to the contractor(s) for demolition and for construction for their information. ACM's shall not be disturbed in this work, except where specifically indicated and required for connections to utilities. Where such connections are required, the contractor shall have the obstructive and adjacent ACM's removed by a licensed abatement contractor using approved procedures as specified. The ACM's that are to remain, and the new non-ACMs, shall be labeled accordingly. The abatement contractor shall mark-up the AMP to show the "as-built" conditions resulting from its work to include the areas where asbestos was abated, the areas where asbestos was encapsulated and the areas where ACM's exist, but were left in place."

3.3 Lead Paint

3.3.1 "A lead-based paint inspection was performed and no lead-based paint was found."

3.3.2 "A lead-based paint inspection was performed and lead-based paint was found in indicated areas. However, the work in this project is not intended to disturb existing lead-based paint."

SECTION 3 - ABATEMENT

3.3.3 "A lead-based paint inspection was performed and lead-based paint was found in the areas indicated. The lead-based paint shall be removed prior to any other work being performed in these areas. The contractor shall be responsible for compliance with all requirements of the Virginia Occupational and Health Administration regulations regarding lead-based paint protection for workers"

3.3.4 "A lead-based inspection was performed and lead based paint was found in the areas indicated. Lead-based paint shall not be disturbed in this work except where specifically indicated and required for connections to utilities. Where such connections are required, contractor shall have the obstructive and adjacent lead-based paint removed by a licensed lead-based paint abatement contractor using approved procedures as required by VOSHA. The lead-based paint that remains and new non lead-based paint areas shall be labeled accordingly."

3.4 Other Material

3.4.1 All environmental remediation and/or removal of all other waste materials shall conform to their applicable federal, state and local laws.

END OF SECTION 3

(4) SITE

4.1 General

- 4.1.1 Do not commence site cleaning operations until temporary erosion and sediment control and plant protection measures are in place.
- 4.1.2 Protect and maintain JMU owned benchmarks and survey control points from disturbance throughout entire construction process.
- 4.1.3 JMU reserves the right to salvage material and equipment. The A/E shall consult with the JMU PM to determine needs per individual project.
- 4.1.4 Each project shall have an appropriate sign identifying the project name and scope. Sign shall be visible from the public way outside of the construction fence and its location shall be approved by JMU Director of FP&C.
- 4.1.5 All debris shall be removed from the site and hauled off campus. All paved areas shall be thoroughly washed. This level of cleanliness shall be maintained throughout the maintenance period.

4.2 Utilities

- 4.2.1 All underground utilities design shall be conceived and designed with an "easement approach" in mind, thus facilitating their maintenance and accessibility. The schematic design utility site plan and all other utility site plans thereafter shall clearly indicate the outline of this utility easement.
- 4.2.2 The contractor shall secure, at the contractor's expense, all utilities hookups and access roads for all construction projects. The contractor shall be required to make all utility connections and is responsible for the removal of all connections and any repairs that may need to be made. This work is to be scheduled with the JMU PM.
- 4.2.3 Connections made to JMU systems shall require our prior approval as to the location, manner and time of the connections. Connections and reinstatements requiring any shutdown of an existing JMU system shall require the shutdown to be done only by JMU personnel. A 14-day advance written notice shall be submitted to JMU PM and shall be approved prior to any connections being made.
- 4.2.4 As soon as temporary connections are no longer required, they shall be immediately removed by the contractor.
- 4.2.5 All utility connections to JMU utilities shall be metered and charged at the current rates. The contractor shall supply and install all metering devices. Metering devices shall be periodically inspected and read by JMU personnel throughout the entire project. Any changes, replacements or alterations to any metering devices shall first be approved by the JMU PM prior to the changes being made. Meters shall be installed in accessible location.
- 4.2.6 Steam connections shall provide for condensate return to the JMU system.
- 4.2.7 As-built drawings shall mark all located lines, whether new or existing.
- 4.2.8 Provide metal-backed warning tape at all underground utility lines. Tape shall be located at half of the distance between the top of the utility line and the approved finished grade height as shown on the site plan.

SECTION 4 - SITE

- 4.2.9 Provide a #10 green insulated conductor in utility trench containing all non-metallic piping. Both ends of the wire shall be accessible and of sufficient length to provide grade-level access, and be contained within approved junction boxes or manholes.
- 4.2.10 Manhole covers shall be designed to VDOT load bearing requirements and shall include identification of the system involved (steam, sanitary sewer, storm drains, electric, telecom, etc.) All manholes shall be at least to ground level.

4.3 Surrounding Areas

- 4.3.1 Do not close or obstruct streets, pedestrian walkways or other any adjacent facilities without direct permission from the Director of Facilities Engineering & Construction.
- 4.3.2 Provide alternative route around closed or obstructed traffic ways or sidewalks.
- 4.3.3 Provide traffic and/or pedestrian signage in the event an alternate or otherwise altered route is provided.
- 4.3.4 Minimize interference, to the greatest extent possible, with all adjoining roads, streets, walks and other adjacent occupied facilities during excavation operations.

4.4 Site Protection

- 4.4.1 Standard construction site fencing should be 8' foot chain link fencing with top rail and a sight-restrictive fabric screening.
- 4.4.2 All chain link fencing and gates shall be made of 9 gauge, 2" weave with Class 2 hot-dipped galvanized wiring. Fencing shall be black vinyl coated.
- 4.4.3 All posts and rails shall be at least Schedule 40 hot-dipped galvanized or high-tensile galvanized steel piping. Posts shall be driven and all exposed metal painted black. Top and bottom rails shall also be painted black. All gates and hardware shall also be painted black.
- 4.4.4 All construction gates should be double locked using contractor and JMU supplied locks.

4.5 Lighting

- 4.5.1 Facilities engineering will provide the concrete base detail for lighting units. Pole base detail is located in the Appendix.
- 4.5.2 All other site lighting details are located in the electrical section.

4.6 Construction Trailer

- 4.6.1 Location shall be approved prior to mobilization and shown on site plan.
- 4.6.2 Provide a full mobilization plan at the preliminary drawing phase.
- 4.6.3 Contractor shall contact the local telephone company for service, telephones and fax machines, etc. The contractor will be permitted to access the telephone company via JMU's telecommunication system. This shall be coordinated with the JMU PM.

END OF SECTION 4

(5) CONSTRUCTION DRAWINGS

5.1 General

- 5.1.1 All drawings prepared for projects within JMU Main Campus boundaries shall be tied to the JMU Survey Control Network. Drawings shall show JMU control network point used in addition to project specific control points established by the project Surveyor. All drawings shall have the meridian based on the JMU Survey Control Network. JMU will provide control point information within the project area. The JMU Survey Control Network is based on Virginia State Plane Grid System, North Zone, U.S. Survey Foot. Horizontal control is NADA83-CORS96-EPOCH2002.0000. Vertical control is NAVD88 (geiod03) U.S. Survey Foot.
- 5.1.2 For projects outside of JMU Main Campus boundaries, it shall be the responsibility of the A/E to establish control points within the project area. All control points established shall be based Virginia State Plane Grid System South Zone U.S Survey Foot. Horizontal control shall be NAD83-CORS96-EPOCH2002.0000. Vertical control shall be NAVD88 U.S. Survey Foot.
- 5.1.3 FM does not loan drawings of any type. The engineering drafting department will make one copy of any required drawings to assist the A/E. Additional copies shall be the responsibility of the A/E and/or the contractor. Any requests for copies of drawings shall be coordinated through the JMU PM. Electronic drawings will be provided if available.
- 5.1.4 Two (2) sets of approved full construction drawings and specifications shall be submitted to JMU at the beginning of the project.
- 5.1.5 Provide a digital copy of each phase of the plans in PDF format, in addition to the required hard copies.
- 5.1.6 All project specifications shall be provided in PDF format (preferred) or in the most current version of Microsoft Word for windows format.
- 5.1.7 Current bid documents are to be dated with the actual date of final submission incorporating the review comments by applicable university reviews.
- 5.1.8 All drawings shall include the following details:
 - 5.1.8.1 Point Number
 - 5.1.8.2 Northing
 - 5.1.8.3 Easting
 - 5.1.8.4 Description
 - 5.1.8.5 Elevation
- 5.1.9 Each drawing shall have a note described how project values were established; e.g. ground traverse, GPS, etc.
- 5.1.10 All electronic drawing data provided to JMU shall be based on Virginia State Plane Grid System, North Zone, U.S. Survey Foot and shall meet all requirements listed above. All drawings are to be provided to JMU in AutoCAD 2005 format (or format compatible with JMU current version) v. Data shall be provided by client to JMU on CD (or other pre-approved methods).

5.2 "As-Built" Drawings

- 5.2.1 Shall include, as a minimum, all of the following:

SECTION 5 - DRAWINGS

- 5.2.1.1 Physical Improvements
- 5.2.1.2 Finished Floor Elevations
- 5.2.1.3 Physical evidence of underground utilities (valves, c/o, hydrants, vents, indicator posts, etc.)
- 5.2.1.4 Sanitary and Storm manhole inverts, pipe sizes, pipe material
- 5.2.1.5 Boundary information (if shown on construction plans)
- 5.2.1.6 Surveyors shall be licensed in the Commonwealth of Virginia.
- 5.2.1.7 As-built drawings shall be provided upon completion of project in a 2-D CAD file, a PDF format and a BIM model.

5.3 Drawing Formats

- 5.3.1 AutoCAD™ versions 2007 through 2015 are the only acceptable file formats for drawing submission to JMU. Data Interchange Files (.DXF files) will not be accepted as an alternative. If project drawings are created using a computer aided drafting and design program other than AutoCAD™, the consultant shall be responsible for any conversion procedures necessary to generate acceptable AutoCAD™ files for submission to JMU. The consultant shall also be responsible for maintaining accuracy and inclusion of all items within the drawings during the translation process. (See Sections 5.4, 5.5 and 5.6 for specific details).
- 5.3.2 Renaming the file extension from the original format (i.e. .DXF, .DGN, etc.) to an AutoCAD™ format (.DWG) will not convert the drawing.
- 5.3.3 Custom menus or “arx” applications are not allowed if it creates a requirement for the drawing to be used. No menus, custom user interface (cui) files or arx applications are to be submitted.
- 5.3.4 BIM models shall be submitted in Revit .RVT format, release 2013 to 2015.

5.4 CAD Standards

- 5.4.1 AutoCAD™ files should not contain more than one drawing sheet per file (.dwg), either by multiple drawings in model space or spread out across several layouts. While this may facilitate the production of construction documents, it can impede the archival process, and create content discrepancies.
- 5.4.2 AutoCAD™ files containing multiple drawing sheets shall be broken down into single sheets prior to delivery to JMU.
- 5.4.3 AutoCAD™ files delivered to JMU shall contain only one drawing and one title block per file.
- 5.4.4 Each CAD drawing should represent a single printed sheet where the file name conspicuously identifies the sheet number (e.g., sheet A2.1 CAD file name might be A2.1.dwg).

5.5 CAD Drawing Structure

- 5.5.1 One folder per discipline, by discipline name (Civil, Landscape, Architecture, etc.).
- 5.5.2 All AutoCAD™ files shall be purged of empty, unused, or non-essential drawing data prior to submittal to JMU. This includes the removal of all unused layers, line type, blocks, fonts, dimension styles, and other entities. Unused objects and entities

SECTION 5 - DRAWINGS

contained in the drawing shall directly apply to the specific purpose of the drawing with the exception of the title block.

- 5.5.3 AutoCAD™ files submitted to JMU shall not contain any frozen layers. Unused entities on frozen layers should be erased, the empty layers purged, and all layers thawed.
- 5.5.4 AutoCAD™ files shall not contain multiple overlaid lines or lines with multiple segments unless the overlaid lines or adjacent line segments are assigned to different layers. Multiple overlaid lines or blocks can be removed from the drawing by using the “OVERKILL” command.
- 5.5.5 Survey date shall be included in the AutoCAD™ files and placed on the appropriate layers.

5.6 BIM Standards:

- 5.6.1 If BIM is required, all CAD drawings shall be exported from Revit. The BIM model shall reflect all as built characteristics, materials, devices, families, etc.

5.7 Portable Document Format (PDF) Requirements:

- 5.7.1 All documents are to be created as PDF files from the original source files, unless approved otherwise in writing by Owner. PDF files shall reside in a folder below the CAD files folder, labeled as “PDF”.
- 5.7.2 The CAD printer shall be Autodesk DWG to PDF.pc3 print configuration.
- 5.7.3 Layer information shall not be included.
- 5.7.4 All documents are to be created with a resolution of not less than 300dpi. All fonts are to be embedded in the PDF.
- 5.7.5 When compression is used, the algorithm shall be LZW, CITT group 4 or Packbits. The PDF document size shall be the same as the original document size if the document were printed; e.g., a 24”x36” print should have a PDF sheet size of 24”x36”.
- 5.7.6 Each document shall be submitted as a single file.

5.8 Layering Standards

- 5.8.1 JMU layering standards are based upon the United States National CAD Standard® - Version 5 that includes the AIA CAD Layer Guidelines. For more detailed layering information and helpful background material visit their website at <http://www.nationalcadstandard.org/ncs5/>.

5.9 AIA Layering Format

- 5.9.1 Layer names may be as short as 6 characters (discipline code + major group) or as long as 16 characters (discipline code + major group + minor group + status). The following are the four examples of acceptable formula variations, with explanations of the formula variables:
 - 5.9.1.1 A-WALL = discipline code + major group
 - 5.9.1.2 A-WALL-FULL = discipline code + major group + minor group
 - 5.9.1.3 A-WALL-DEMO = discipline code + major group + status code
 - 5.9.1.4 A-WALL-FULL-DEMO = discipline code + major group + minor group + status

SECTION 5 - DRAWINGS

5.10 Lines, Objects And Entity Properties

5.10.1 AutoCAD™ entities are created using these standards:

5.10.1.1 Entity colors shall be defined by layer, not entity.

5.10.1.2 All lines, objects, blocks and entities shall be drawn where the Z-axis is 0 (zero), meaning there is no elevation to the elements in the drawing and the drawing is truly 2-dimensional.

5.11 Scale and Units

5.11.1 All objects are to be drawn at full scale for the assigned unit of measure.

5.11.2 All drawings are to have a unit of measure assigned and not set to "unitless."

5.12 Model And Paper Space Usage

5.12.1 Place title blocks, schedules and general notes at full-scale (1:1) in paper space.

5.12.2 Do not place or draw model-related blocks, tags and objects in paper space.

5.12.3 Scale objects using paper space viewports. Zoom viewports to the appropriate scale.

5.13 External References (XREFs)

5.13.1 AutoCAD™ drawings shall not contain any XREF's prior to submittal.

5.13.2 External references (excluding drawings, .DWG) shall be inserted into the drawing as a block prior to submittal.

5.13.3 XREF blocks shall be exploded and the resulting objects placed on the appropriate layer.

5.13.4 All drawings containing other drawings as an XREF should bind the external referenced drawing into the main drawing. This shall be done using the "Insert" bind type.

5.13.5 File translation from non-AutoCAD™ systems resulting in wall blocks within AutoCAD™ are unacceptable.

5.13.6 The "eTransmit" command can be used to ensure all dependent files are included.

5.14 AutoCAD Drawing Support Files

5.14.1 Only native AutoCAD™ fonts, line types and hatch patterns, or the approved CAD symbolism provided by the AIA CAD Standards, is acceptable.

5.14.2 Custom fonts, line types and hatch patterns, including those provided by 3rd party software, are not acceptable.

5.14.3 Postscript fonts shall not be used.

5.15 File Transmittal

5.15.1 The content of electronic drawings provided by the architect/engineer shall match the delivered original hard copy set as closely as possible.

5.15.2 To ensure drawings adhere to the guidelines presented in this document, the CAD Quality Assurance Checklist (see Section 5.18) shall be completed and submitted with all AutoCAD™ drawings submitted to JMU.

SECTION 5 - DRAWINGS

5.16 Record Drawing Requirements

- 5.16.1 The A/E shall submit final “as-built” documents to JMU on CD-ROM/DVD-ROM and/or USB flash drive, in addition to hardcopy format in accordance with the contract.
- 5.16.2 The CD-ROM/flash drive should contain the “as-built” information and .DWG, and .PDF formats of the CAD drawings in accordance with the CAD standards outlined herein.
- 5.16.3 All record drawings, including civil and site drawings, are required to have a signed and dated professional seal.
- 5.16.4 Every project shall depict *all* construction features, including all changes made during the construction process and all concealed utilities accurately located, as required by the State of Virginia Standard General Conditions.

5.17 Error-Free AutoCAD Drawing Deliveries

- 5.17.1 JMU recognizes that many of its vendors do not use our same CAD system. However, the University expects the vendors who work with non-AutoCAD™ file formats to submit “.DWG” formatted CAD files upon project closeout that are fully compliant with all of the standards outlined herein. These files shall have no loss of drawing entities or project data that can result from standard CAD file translation procedures.
- 5.17.2 All “.DWG” files and CAD drawing entities submitted at the end of a project should be capable of manipulation through standard AutoCAD™ drafting procedures.

END OF SECTION 5

SECTION 6 - PARKING LOTS

(6) PARKING LOTS

6.1 General

- 6.1.1** All parking lots are to have "CG-6" curb & gutter.
- 6.1.2** All parking stall widths shall be nine (9') minimum.
- 6.1.3** Provide ADA-compliant parking within 25' of the building.

6.2 Standard parking lots

- 6.2.1** This shall be used for all general use parking lots.
- 6.2.2** Sub-grade shall be compacted to a minimum of 95% maximum proctor density.
- 6.2.3** Provide a 6" layer of #21A stone compacted to >95%.
- 6.2.4** Provide a 2" layer of SM-9.5AL bituminous concrete surface.

6.3 Heavy parking lots

- 6.3.1** This shall be used for all areas subject to eccentric vehicular loading.
- 6.3.2** Sub-grade shall be compacted to a minimum of 95% maximum proctor density.
- 6.3.3** Provide a 6" layer of #21A stone compacted to >95%.
- 6.3.4** Provide a 3" layer of BM-25 bituminous concrete base layer.
- 6.3.5** Provide a 2" layer of SM-9.5AL bituminous concrete surface.

6.4 Asphalt Cut and Patch Requirements

- 6.4.1** All open pavement cuts shall comply with the VDOT "Special Provisions for Pavement Open Cuts" guidelines.

END OF SECTION 6

(7) LANDSCAPING

7.1 General

- 7.1.1 All campus landscaping for both new and existing buildings and facilities shall comply with these guidelines.
- 7.1.2 All landscaping shall comply with the approved site plan landscaping design.
- 7.1.3 Contractor shall protect the campus landscape before, during and after construction.
- 7.1.4 Tree protection fencing shall be installed around all existing trees noted in the approved landscaping plan to remain. Fencing shall extend a distance from the trunk of 1.25 feet per inch of trunk diameter or 6', whichever is greater. Fencing shall be installed prior to any equipment arrival on site. Fencing shall be galvanized chain link, 4' in height. Fence shall be maintained for the duration of the project, and no storage, stockpiling or vehicle parking shall occur any time within the tree protection fencing.
- 7.1.5 Roots encountered outside of the tree protection area require notifying the JMU PM.
- 7.1.6 The contractor shall be fully responsible for the establishment, protection, watering and growth of all new grasses and other plantings. Grass shall be grown to 85% germination by the completion of the project.
- 7.1.7 Plants shall be fully guaranteed for one full year beyond the issuance of the Certificate of Occupancy. Replacement of failed plantings shall take place within two (2) weeks of notification.
- 7.1.8 Backfill in other areas that are to be planted, sodded or otherwise landscaped shall be clean fill within 6" of finished grade. Remainder to be clean, sifted and ½ inch screened high quality topsoil. This fill shall be 90% compacted in 6" lifts.
- 7.1.9 The F.M. landscaping department reserves the first rights to contract any or all of the required landscaping on new or renovation construction projects.

7.2 Plantings

- 7.2.1 Provide a 24" minimum root barrier for all trees.
- 7.2.2 No tree smaller than 1.25" caliper shall be specified.
- 7.2.3 All trees shall be properly staked to avoid damage.
- 7.2.4 Trees shall not be planted with the wire cages, grow bags, plastic pots or any other root-encasing device.

7.3 Lawns

- 7.3.1 *JMU Campus Sturdy Sun & Shade Grass Seed Mixture* (300 lbs. per acre):
 - 7.3.1.1 Bullseye Tall Fescue 30.15%
 - 7.3.1.2 Magellan Tall Fescue 30.07%
 - 7.3.1.3 Turbo Tall Fescue 29.06%
 - 7.3.1.4 Corsair Kentucky Bluegrass 9.90%

7.4 Hydro-seeding

- 7.4.1.1 Do not overspray on building or established planting beds.
- 7.4.1.2 Low areas subject to surface drainage shall be sodded in lieu of hydro-seeding.

SECTION 7 - LANDSCAPING

7.5 Drainage

- 7.5.1 Where possible, the drainage design should retain the site's natural drainage pattern. Other than in approved site drainage elements, the ponding of water on site ground surfaces is not allowable.
- 7.5.2 Hardscape area drainage shall have a minimum slope of one quarter inch per foot (1/4":1') away from building(s).
- 7.5.3 No landscaping features shall divert water towards buildings.
- 7.5.4 The landscape drainage concept shall be coordinated with the approved site drainage plan.

7.6 Water Conservation

- 7.6.1 The designer shall consider landscape design concepts that incorporate water and energy conservation methods. Include appropriate provisions for irrigation equipment, the selection of drought-resistant plantings and the design of adequate lawn and other maintenance-intensive areas.

7.7 Design

- 7.7.1 Softscapes are generally preferred to hardscapes.
- 7.7.2 Plantings adjacent to curb cuts at the entrance or exit of roadways, parking lots and pedestrian areas, shall be designed to provide clear visibility for persons leaving or entering the vehicular way.
- 7.7.3 Street trees shall be kept at a minimum of 10' from the curb.
- 7.7.4 No plantings shall have the center of the root ball within 10' of the exterior wall of any building.
- 7.7.5 The ground level surface for the entire perimeter of all buildings shall have minimum of a 4" thick layer of hard-pack clay, within a 5' band around the walls with a minimum of 6" of fall within the first 4' of the building.
- 7.7.6 Plantings and other landscape features shall take into account the maximum expected canopy and be designed not to extend within 5' of any exterior building walls.
- 7.7.7 Plants shall not block or cover building windows, security lighting, site lighting or access to any utilities.
- 7.7.8 When used, river-run gravel shall be 5/8" maximum size diameter, installed to a minimum thickness of 2", with an approved landscape barrier underneath.
- 7.7.9 No river rock or other projectile-type material(s) shall be used.
- 7.7.10 Retaining walls shall be incorporated into other design features; e.g. stairs, ramps, planters, etc.
- 7.7.11 Tree grates shall be steel type, not cast iron and in compliance with applicable ADA standards.
- 7.7.12 Tree canopies that project into accessible sidewalks and other designated egress path areas shall have no limbs within an 8' height above any part of the accessible route, at any stage of the life of the tree.

SECTION 7 - LANDSCAPING

7.7.13 Tree wells located in sidewalks shall have the top of their root ball at the sidewalk surface.

7.7.14 See Appendix for bio-retention pond requirements.

7.8 Plant Types to Avoid

7.8.1 Plants having invasive surface root system near underground utilities, building foundations and lawn areas

7.8.2 Plants unduly prone to disease; e.g. Birch, Elm, etc.

7.8.3 Plants with incompatible water requirements from existing landscaped areas

7.8.4 Plants particularly active in fruit, pollen or leaf fall

7.8.5 Plants known to have particularly brittle structures; e.g. Bradford Pears, etc.

END OF SECTION 7

(8) E&S/STORMWATER

8.1 General

- 8.1.1** JMU operates a Virginia Erosion and Sediment Control Program (VESCP) and Virginia Stormwater Management Program (VSMP) through Annual Standards and Specifications as approved by the Virginia Department of Environmental Quality (DEQ). This document provides general guidelines for ESC and SWM plan preparation and is regularly updated to reflect amendments to ESC and SWM law. For the latest version, please visit our website at www.jmu.edu/stormwater or contact the JMU Stormwater Coordinator.
- 8.1.2** All projects shall comply with JMU's Annual Standards and Specifications for ESC & SWM, the Virginia Erosion and Sediment Control Law, the Virginia Stormwater Management Act, associated ESC and SWM regulations and the Virginia Stormwater Program Permit regulations. An E&S control plan, narrative and supporting documentation shall be prepared and submitted to Facilities Engineering for review for any project which disturbs 10,000 square feet or more, or is considered part of a larger common plan of development. A stormwater management plan, narrative and supporting documentation shall be prepared and submitted to Facilities Engineering for review for any project which disturbs one (1) acre or more, or is considered part of a larger common plan of development.

8.2 Plans

- 8.2.1** A complete Stormwater Program Permit plan (SWPPP) includes:
- 8.2.1.1** An approved ESC plan
 - 8.2.1.2** An approved SWM plan
 - 8.2.1.3** A pollution prevention plan
 - 8.2.1.4** Impaired waters information
- 8.2.2** Submit two (2) complete copies of the ESC plan, SWM plan, narrative, ESC/SWM Plan Preparer/Reviewer checklist and any other supporting documentation to the JMU Stormwater Coordinator for review. Resubmissions shall also require two complete sets.
- 8.2.3** Contractor shall file registration statement to the DEQ for the state construction general permit, if applicable. A stormwater pollution prevention plan (SWPPP) shall be prepared in accordance with the requirements of the General Permit for Discharges of Stormwater from Construction Activities before submitting this registration statement.
- 8.2.4** A pre-construction conference shall be required to clarify ESC/SWM roles, responsibilities and obligations associated with the project. At a minimum, the pre-construction conference shall be attended by the JMU Project Manager, JMU Construction Inspector, JMU Stormwater Coordinator, construction general permit operator and the responsible land disturber (RLD) assigned to the project. Contact the JMU Project Manager for coordinating this meeting.
- 8.2.5** No land disturbing activity shall occur prior to the approval of the required ESC and SWM plans, receipt of construction general permit from DEQ (if applicable), and having a pre-construction conference.

SECTION 8 - E&S/STORMWATER

- 8.2.6 JMU shall perform inspections on the project to confirm compliance with the VESCP, VSMP, Municipal Separate Storm Sewer System (MS4) program and Illicit Discharge Detection and Elimination (IDDE) program. It shall be the responsibility of the contractor designated as the construction general permit operator and/or the RLD for the project to perform any needed corrective action(s) in response to any non-compliance issues found during inspections.
- 8.2.7 It shall be the responsibility of the construction general permit operator to have a complete and updated SWPPP on-site for review, if applicable.
- 8.2.8 Any amendments to the approved plan that may affect ESC or SWM shall be submitted to the JMU Stormwater Coordinator for review before implementing measures on-site. This shall also include any support activities outside the projects limits of disturbance.

8.3 Project Completion

- 8.3.1 A permanent vegetative cover is established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be considered established until a uniform ground cover is achieved that is mature enough to survive and will inhibit erosion. (9VAC25-840-40 1)
- 8.3.2 All temporary erosion and sediment control measures are removed and any trapped sediment and disturbed soil areas resulting from the disposition of temporary measures shall be permanently stabilized. (9VAC25-840-40 18)
- 8.3.3 A construction record drawing for permanent stormwater management facilities shall be submitted to the JMU Stormwater Coordinator. The construction record drawing shall be appropriately sealed and signed by a professional registered in the Commonwealth of Virginia, certifying that the stormwater management facilities have been constructed in accordance with the approved plan. (9VAC25-870-55 D)

END OF SECTION 8

(9) EXCAVATION & GRADING

9.1 Excavation

- 9.1.1 The limits of all areas to be excavated shall be outlined in white paint, by the contractor requesting utility location services.
- 9.1.2 No excavation work shall begin until all temporary E&S controls and plant protection measures are in place and the utility excavation permit is secured through the JMU Utilities Location Department (see Section 10).
- 9.1.3 Strip topsoil to depth of 6" in a manner to prevent intermingling with underlying subsoil on other waste materials.
- 9.1.4 Stock pile topsoil from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
- 9.1.5 Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavation materials may include rock, soil and any unforeseen obstructions. No changes in the contract sum or the contract time shall be authorized for rock excavation or removal of obstructions without prior consent from JMU. Cost shall be predetermined in the allowance summary by contract.
- 9.1.6 All open excavations shall be protected by temporary fencing or other approved means to ensure public safety. Not more than 100 linear feet of trench may be opened at one time. The contractor should close completed trench immediately upon approved inspection. Excavated material shall be placed on the uphill side of the trench. All abounded wires, pipes, etc. shall be removed from the fill material prior to replacement in the trench.
- 9.1.7 Contractor shall furnish, erect and maintain all shoring, sheeting, bracing and pumping equipment required to support and protect all excavations. Contractor shall provide all barriers, signs, and lights required to protect workmen and the public in and around excavated areas.
- 9.1.8 All pipe ends shall be closed while unattended.
- 9.1.9 Blasting will be allowed with the approval of the JMU PM. All necessary precautions shall be taken to prevent damage to existing buildings, utilities, etc. The use of blasting mats is required. Blasting shall be accomplished by a company certified and licensed to do this type of work. The contractor shall be responsible for obtaining all local, state and federal permits.

9.2 Grading

- 9.2.1 Place backfill and fill soil materials in layers not more than 8" in loose depth for materials compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.
- 9.2.2 Grading operations shall avoid soils and debris spillover. Large areas to be graded shall limit clearing the ground too far in advance, to limit erosion. Dust control shall be provided during all grading operations.
- 9.2.3 Slope gradients shall be designed to facilitate surface drainage and limit soil erosion. The preferred maximum slope for plated banks is 3:1. In geologically stable areas, up

SECTION 9 - EXCAVATION

to 1:1 may be permitted for exposed rock slopes. Slopes for turf areas should be 1.5% minimum cross fall for drainage, and hardscapes should be between 1% and 2%.

- 9.2.4 Provide clean #57 backfill within 5' of all exterior walls adjacent to building.
- 9.2.5 Rocks shall not be used for any fill material. All excavated rock shall be removed from university property unless otherwise approved by project manager.
- 9.2.6 Trench backfill under paved areas, roadways, concrete walkways, patios, plazas and/or any other areas intended to have a permanent surface, shall be of flowable, cementitious type fill material. This is commonly referred to as "slurry."
- 9.2.7 All fill shall be of proper type and proper compaction. All final grading shall be smooth and blended with existing contours. All exposed stones and other debris shall be removed prior to application of topsoil or any other fill.

END OF SECTION 9

SECTION 10 – UTILITIES LOCATING

(10) UTILITIES LOCATING

- 10.1** Both locally owned and university owned utilities exist on the JMU campus. The contractor shall obtain the JMU-issued excavation permit prior to the start of any excavation work. Excavation permit application forms shall be obtained from the JMU Facilities Engineering and Construction Department. Separate provisions shall always be made to contact Miss Utility for any ground penetrating project. The following applies to coordination with the JMU Utility Locating Department (ULD):
- 10.1.1** The permit is only valid for the specified project on JMU property.
 - 10.1.2** Contractor shall contact the JMU ULD a minimum of 5 working days prior to all excavations.
 - 10.1.3** Excavation permit shall only be issued after the JMU ULD marks all utility lines.
 - 10.1.4** The excavation permit is only valid for 15 calendar days from the date issuance.
 - 10.1.5** Once the JMU ULD has established the utility line markings, it is the responsibility of the contractor to continue to call the JMU ULD every ten (10) days thereafter to remark the lines until the area is fully excavated. An updated permit shall be issued upon each line remarking.
 - 10.1.6** The damage to any encountered utilities shall be cause for immediate contact of the JMU Utilities Location Department and a stop-work on all excavations.
 - 10.1.7** The contractor shall be fully responsible for any and all resulting damages within the JMU ULD marked lines for the entire excavation process.

END OF SECTION 10

(11) IRRIGATION

11.1 General

- 11.1.1** JMU prefers to have Toro Irrigation products.
- 11.1.2** JMU shall be responsible for temporary service if system should be down for repairs, etc. JMU will need to know immediately if service will be interrupted for greater than six (6) hours.
- 11.1.3** Newly installed systems are required to have a Toro TFS series flow sensor installed.
- 11.1.4** All irrigation systems shall be installed with an approved RPZ backflow preventer installed by a licensed plumbing contractor. (see Plumbing section)
- 11.1.5** All fittings installed shall be sch40 PVC pressure rated fittings unless otherwise specified. When using female adapters the fitting should be sch80 PVC with a metal reinforcement ring. All male adapters installed shall be sch80 PVC.

11.2 Winterization

- 11.2.1** Contractor is to provide the initial startup, first winterization and first spring start-up.
- 11.2.2** All systems installed shall be fitted with an interior winterization connection where practicable. At no time shall this connection be more than 5' from the building and located in the main valve box.
- 11.2.3** Provide a 1" connection for an air compressor after the main shutoff valve at the winterization blowout.

11.3 Piping

- 11.3.1** All sch40 pipe shall meet ASTM D-1785. When installed, the piping should be sized so that velocity shall never exceed 5 feet per second.
- 11.3.2** Gasketed piping is allowed as long as proper thrust blocking is provided.
- 11.3.3** 1/2", 3/4", and 1 1/4" pipe and fittings are not to be used without prior approval.
- 11.3.4** Flexible pipe attached to lawn and landscape sprinkler heads shall be no less than 12" and not to exceed 2' in length.

11.4 Pipe Installation

- 11.4.1** Non-winterized portions of the irrigation water main shall be buried to a minimum depth of 36".
- 11.4.2** A minimum of 2" horizontally is required between pipes in the same trench.
- 11.4.3** Pipes 3" and larger require thrust blocking. Thrust blocks are to be anywhere that the pipe changes directions, sizes, valves and terminations.
- 11.4.4** No trenching is permitted inside the drip line of trees.
- 11.4.5** All PVC piping shall have a tracer wire installed 14-gauge or larger. The recommended color for tracer wire is green.

11.5 Valve Boxes

- 11.5.1** A standard valve box shall be used on 1" systems and a jumbo valve box shall be used on systems 1.5" and greater.

SECTION 11 - IRRIGATION

- 11.5.2 Heavy duty full-port brass ball valve for systems with 2" or smaller main line and a cast iron gate valve on systems 2.5" and larger. The valve shall be sized the same as the mainline.
- 11.5.3 Valve boxes shall be supported by bricks, with their tops set flush to finished grade before backfilling.
- 11.5.4 No more than two 1" valves per box. Valves 1 ½" and larger limited to one per box.
- 11.5.5 Wire splicing shall be in a 10" round box unless the splicing takes place at a valve manifold.
- 11.5.6 Valve boxes are to have green lid in turf areas and a brown lid in mulched landscape areas. Valve boxes located three feet or less from paved surface to be traffic rated unless otherwise approved by JMU.

11.6 Valves

- 11.6.1 All electric valves shall be Toro P-220 with the "Ez-Reg" pressure regulator.
- 11.6.2 A ball valve is required before each valve manifold to assist in repairs.
- 11.6.3 The ball valve shall be schedule 80 PVC or heavy duty brass.
- 11.6.4 A minimum of 6" of pipe is required before the ball valve and 6" after the electric valve that does not contain any fittings.

11.7 Sleeving

- 11.7.1 Sleeves shall be installed anywhere pipe or wire crosses under pavement, sidewalks or other finished areas. This sleeve shall be a minimum of 4" in diameter, or twice the size of the piping served.
- 11.7.2 Sleeves dedicated for future use shall be installed in under roads and at the specific request of JMU.
- 11.7.3 All sleeves shall be schedule 80 PVC.

11.8 Heads

- 11.8.1 Spray heads shall be 6" for lawn areas and 12" in landscape beds.
- 11.8.2 All sports fields' heads shall be on 1" sch40 swing joints.
- 11.8.3 Backfill material surrounding sprinkler heads shall be permeable same or light pea gravel to discourage ponding around sprinkler head. Sprinkler head shall be installed to the proper grade and shall be hand compacted only.
- 11.8.4 Heads installed along paved surface to be no less than 4" from edge. The head shall be vertical and set to grade.
- 11.8.5 **Approved Fixed Heads:**
 - 11.8.5.1 Toro 570Z series with check valve and Toro Precision nozzle.
 - 11.8.5.2 Hunter Pro-Spray PRS40 with check valve and Toro Precision.
 - 11.8.5.3 Rainbird 1800 SAM-PRS series with check valve and Toro Precision nozzle.
- 11.8.6 **Approved Rotating Heads:**
 - 11.8.6.1 **Lawn and Landscape**
 - 11.8.6.1.1.1 Toro Super 800 w/check
 - 11.8.6.1.1.2 K-Rain Super Pro w/check
 - 11.8.6.1.1.3 Hunter PGP Ultra w/check

SECTION 11 - IRRIGATION

11.8.6.1.1.4. Rainbird 5000 Series w/check

11.8.6.2 Sports Fields

11.8.6.2.1.1. Toro T7 Stainless Steel

11.8.6.2.1.2. Hunter I-40 Stainless Steel

11.8.6.2.1.3. K-Rain ProSport Stainless Steel

11.8.6.2.1.4. Rainbird 8005 Stainless Steel

11.8.6.2.1.5. Toro 2001 Stainless Steel (Limited Availability)

11.9 Controller

11.9.1 Irrigation control shall be provided by a Toro Sentinel controller. Irrigation controller shall be installed by a contractor. Controllers shall be installed indoors in a stainless steel cabinet. JMU will decide whether or not the controller is to have a faceplate.

11.9.2 All circuits to be in ¾" conduit from outside building to control panel at central location.

11.10 Electrical

11.10.1 All exterior wiring shall be in an approved electrical PVC conduit.

11.10.2 All electrical splices to be in 3M direct burial splice kits.

11.10.3 All irrigation wire shall be 18-gauge for multi-strand wire and 12 or 14 gauge depending on length for 2-wire systems.

11.10.4 Systems with less than 10 zones shall be multi-strand. The white wire shall be the common. With multi-strand systems, two wires need to be left unused for future additions. The extra wires are to be labeled in the controller and not wired to anything. The ends of the wires are also to be labeled.

11.10.5 Systems with greater than 11 zones shall be Toro 2-wire.

11.10.6 Wire splices at electrical valves shall be made only with approved device listed within these specifications. Wherever a splice occurs it shall be accessible through an approved valve box. At any splice or valve box there should be a minimum of 24" of coiled wire 1" in diameter for slack in future repairs and surge protection.

11.10.7 All PVC piping shall have a tracer wire installed so that it can be located in the future. The tracer wire shall be 14-gauge or larger in size. The recommended color for tracer wire is green. A connection point shall be left at each valve box to aid in future irrigation locating.

11.11 Mapping

11.11.1 Contractor to provide a fully detailed "as-built" irrigation map of all piping, valves, vaults and all other irrigation system components to JMU within 30 days of project completion.

11.11.2 All irrigation valve circuits shall be colored and numbered to correspond to zones on irrigation map.

11.11.3 All maps shall include detailed measurements from as many reference points as necessary to determine all component locations.

SECTION 11 - IRRIGATION

11.12 Inspections

- 11.12.1 All piping shall be visually inspected for leaks after installation.
- 11.12.2 Mainlines and laterals shall be pressure tested to maximum working pressure and held at that pressure for one hour.
- 11.12.3 The entire irrigation system is to be guaranteed free from leaks for at least one year after installation. Any leakage occurring during this one year period shall be corrected by the contractor, at their expense.
- 11.12.4 The entire irrigation system shall be in working order for final inspection.
- 11.12.5 Final inspection shall be performed by JMU's irrigation technician. The contractor shall be on-site for this inspection and shall provide the "as-built" drawings at that time.

11.13 Repairs

- 11.13.1 All repairs are to be made with like materials.
- 11.13.2 Repairs shall be guaranteed to be free from defects for one year.

END OF SECTION 11

SECTION 12 - FOOTINGS & FOUNDATIONS

(12) FOOTINGS & FOUNDATIONS

12.1 Footings

- 12.1.1 Over-excavated footings shall only be backfilled with #57 stone or “flowable fill,” and shall be approved by the Engineer of Record *prior* to placement.
- 12.1.2 Clean cut earth forms are acceptable for non-exposed concrete footings.
- 12.1.3 Under-slab vapor barrier shall be continuous, extending under and around all sides of the building footing and incorporated into the exterior foundation water-proofing system.
- 12.1.4 The horizontal ledge, or top of all footings, shall be parged away from the foundation and incorporated into the below-grade damp or water-proofing foundation design.

12.2 Foundations

- 12.2.1 All foundations shall have exterior drain tile that drains to daylight or to an approved stormwater system.
- 12.2.2 Drain tile shall be located adjacent to the bottom of the footing.
- 12.2.3 Drain tile shall be protected against infiltration of stone or fine granular material by the use of a “sock” or other approved encasing material.
- 12.2.4 All foundations shall be backfilled with a minimum of a 5’ width of #57 stone against the foundation, wrapped in landscaping fabric on all sides exposed to earth backfill.
- 12.2.5 All foundations, whether containing below-grade occupiable space or not, shall be fully waterproofed with both direct-applied coatings and dimpled-membrane coverings.
- 12.2.6 Minimum thickness of all sub-slab and foundation vapor barriers shall be 15mils and fiber reinforced.

END OF SECTION 12

(13) CONCRETE

13.1 General

13.1.1 The following American Concrete Institute (ACI) are included as a reference:

13.1.1.1 *ACI 301* – “Specification for Structural Concrete”

13.1.1.2 *ACI 318* – “Building Code Requirements for Structural Concrete,” and all referenced standards therein

13.1.1.3 *ACI 305* – “Guide to Hot-Weather Concreting”

13.1.1.4 *ACI 306* – “Guide to Cold-Weather Concreting”

13.1.1.5 *ACI 347* – “Guide to Formwork for Concrete”

13.1.2 All construction drawings proposing new structural concrete placement shall include the Statement of Special Inspections in accordance with VCC table 1704.4.

13.2 Concrete Mixes

13.2.1 All concrete shall have a minimum 28-day compressive strength of 4000psi.

13.2.2 All exposed exterior concrete shall be classified as “Exposure Class F3” in accordance with ACI 318 (table 4.4.1). Air entrainment for exposed exterior concrete shall be provided at this classification.

13.2.3 The use of admixtures is not recommended.

13.3 Formwork

13.3.1 Exposed concrete forms shall be inspected by the JMU PM or project inspector prior to use or re-use.

13.3.2 Release agents shall meet all current EPA requirements. Only non-staining, water-based agents shall be used.

13.4 Slump

13.4.1 Shall be determined by code based on application.

13.4.2 Shall be verified by special inspection.

13.5 Placement

13.5.1 All concrete placement shall be in accordance with ACI 318, and the referenced provisions therein.

13.6 Interior Slabs

13.6.1 All slabs shall incorporate an approved expansion joint at all slab edges.

13.6.2 All interior slabs shall include a vapor barrier. The exceptions of VCC 1910 are limited to applying only to areas such as driveways, sidewalks, etc.

13.6.3 All slabs shall have a 6” minimum base layer of #57 stone base and 2” of clean, finely-graded, compactable sand below the vapor barrier.

13.6.4 Under-slab vapor barrier shall be a minimum thickness of 15-mils.

13.6.5 Vapor barrier joints and all other penetrations shall be overlapped a minimum of 6” and shall be taped with an approved vapor-barrier tape per manufacturer’s specifications.

SECTION 13 - CONCRETE

13.6.6 Exposed *interior* concrete slabs shall be sealed in accordance with the building design, but shall always be designed to be highly resistant to de-icing salt exposure. Acrylic sealants are not allowed.

13.7 Sidewalks and Exterior Slabs

- 13.7.1** All concrete shall be designed in accordance with accepted engineering practices in regards to potential vehicular loading. Pedestrian-only sidewalks shall have a 6" minimum base of #57 or #21 stone beneath the concrete.
- 13.7.2** Sidewalks shall be a minimum of 8' in width.
- 13.7.3** Sidewalks shall be a minimum of 6" in thickness, except as noted for fire apparatus access or other engineered loading scenarios.
- 13.7.4** Provide ½" expansion joints at a maximum distance of 20'. Plastic-capped expansion joints shall remove the plastic and caulk the tops.
- 13.7.5** They shall also be scored at 5' intervals.
- 13.7.6** All sidewalks shall be reinforced with 6x6 W1.4/W1.4 welded wire fabric (WWF) or fiber-reinforced concrete. Overlap in the WWF shall be a minimum of 6" and shall not occur within 12" of the score.
- 13.7.7** Sidewalks shall not include a vapor barrier.
- 13.7.8** Exposed *exterior* slabs and sidewalks shall be treated with a penetrating sealer (silanes, siloxanes and silicates), in accordance with the manufacturer's specifications. Sealants shall be shown to be compatible with the air-entrainment percentage of the concrete, and shall specify curing time before application.

END OF SECTION 13

(14) MASONRY

14.1 General

- 14.1.1 All Bluestone specs shall be contained in the Bluestone section. This section applies to all other structural and veneer masonry walls.
- 14.1.2 The top courses of all open masonry shall be durably protected from foreign object entry at the end of every day.
- 14.1.3 Partially completed walls shall not be toothed, but shall be racked back at the end of each day.
- 14.1.4 All work shall be plumb, level and true to line. Story poles laid out with courses shall be used on all masonry construction.
- 14.1.5 At the start of each work day the exposed tops of all units shall be cleaned and free of all dust and debris and dampened before resuming work.
- 14.1.6 All masonry shall be dampened before application to prevent the rapid curing of mortar.
- 14.1.7 When cut masonry units are necessary, only clean, square cuts shall be allowed and all adjacent head and bed joints shall be of uniform thickness.
- 14.1.8 Minimum thickness of all structural CMU walls is 8".
- 14.1.9 FHA block or other semi-solid block shall not be used in lieu of required solid masonry.

14.2 Veneer

- 14.2.1 All masonry veneer buildings shall use pre-cast, non-porous sills for all punched openings.
- 14.2.2 Sills shall be one-piece when the opening is <8' in width. Where multiple piece sills are used, the vertical joints shall be located in line with window openings, flashing joints or other wall elements above that create the potential for increased areas of wetting.
- 14.2.3 Sills shall extend a minimum of 4" in each direction beyond the width of the opening.

14.3 Mortar

- 14.3.1 Masonry mortar shall not be mixed unless the outdoor air temperature is above 40° F and rising without the specific approval of the project manager. Any cold-weather mortar mixing and applications shall comply with the most restrictive provisions of the current MSJC code.
- 14.3.2 All masonry shall have full bed and head joints.
- 14.3.3 Mortar shall not be re-tempered.
- 14.3.4 All joints shall be uniformly struck and the backsides shall not be parged. Exposed joints shall be struck in timely manner to produce an even coloration throughout the entire wall.
- 14.3.5 All mortar joints shall be concave or weathered to minimize water intrusion.
- 14.3.6 Cavity protection shall be provided throughout the entire installation to minimize backside mortar droppings.
- 14.3.7 Projecting courses shall not be set until mortar is set enough to prevent extrusion. All projecting courses shall be durably supported until mortar has cured.

SECTION 14 - MASONRY

14.4 Flashing

- 14.4.1 Flashing courses and weeps shall be inspected by the JMU PM or inspector before covering.
- 14.4.2 Weep holes or screeds shall not be damaged by masonry installation and shall aesthetically complement the surrounding area.
- 14.4.3 Every course of flashing and weeps shall be protected by a minimum of a 10" approved mortar net.
- 14.4.4 Weeps shall be placed at a minimum of 24" apart and shall extend into the cavity to at least the full cavity depth.
- 14.4.5 Weeps shall be designed to allow air circulation through the entire cavity.
- 14.4.6 Flashings shall be regletted into the backing masonry joints and sealed with an elastomeric sealant.

14.5 Grout

- 14.5.1 All metal doorframes in masonry walls shall be solid grouted.
- 14.5.2 Grout mixtures shall be constantly monitored by an on-site 3rd party inspector.

14.6 Accessories

- 14.6.1 All masonry ties and other structural elements shall be grade 304 stainless steel.

END OF SECTION 14

(15) BLUESTONE

15.1 General

- 15.1.1 This section addresses the installation of new Bluestone veneer on exterior and interior walls of new building construction and may also be used as a general guideline for the repair of existing Bluestone veneer. It is *not* intended to cover work associated with solid Bluestone wall construction, as is typically found on many of the Bluestone Campus Buildings constructed prior to 1950.

15.2 Bluestone Sources

- 15.2.1 Bluestone shall be furnished from a single quarry source as specified in the construction drawings and shall be pre-approved by JMU.
- 15.2.2 Bluestone sources previously used on projects at JMU include the following:
- 15.2.2.1 Frazier Quarries, Harrisonburg, VA
 - 15.2.2.2 Penn Direct Stone, Oakton, VA (preferred)
 - 15.2.2.3 Lilac Quarries, Gilbertsville, NY
- 15.2.3 Bluestone from other sources may be used only if approved in writing by JMU. Stone samples shall be furnished as a part of the review and approval process.

15.3 Veneer Anchors and Embedded Accessories

- 15.3.1 *All stone ties and anchors shall be stainless steel.* Galvanized steel ties are not acceptable for any stone masonry work at JMU.
- 15.3.2 Prefabricated veneer anchor ties designed specifically for stone masonry shall be used as the standard method for securing Bluestone veneer to structural backup materials.
- 15.3.3 Cast-in-place concrete backer walls shall use an embedded stainless steel channel slot cast into the concrete wall face in conjunction with stainless steel slot ties.
- 15.3.4 Individual screw-attached wall ties may be used for attachment of Bluestone to masonry backup walls.
- 15.3.5 Install stone anchors at spacing not to exceed 16" vertically and 24" horizontally.
- 15.3.6 Ensure that anchors are placed such that they extend a minimum of 1.5" inches into the bed joint of the stone.
- 15.3.7 Provide additional anchorage for stones greater than 2ft² and at all punched openings.

15.4 Mortar and Grout

- 15.4.1 Mortar mix for setting stone shall be:
- 15.4.1.1 1 part Portland cement
 - 15.4.1.2 ½ part hydrated Lime
 - 15.4.1.3 4.5 parts sand
- 15.4.2 Mortar mix for pointing shall be:
- 15.4.2.1 1 part Portland cement
 - 15.4.2.2 1 part hydrated lime
 - 15.4.2.3 3 parts sand
- 15.4.3 Color pigment additive may be used as approved by JMU.

SECTION 15 - BLUESTONE

- 15.4.4 Other mortar additives such as calcium chloride, anti-freeze admixtures, air entraining admixtures or other admixtures which promote corrosion of ferrous metals are strictly prohibited.
- 15.4.5 Grout for infill of cavity space behind stone in short wall or concrete wall construction at or near grade/foundation levels shall be Portland cement/sand grout meeting proportion requirements of ASTM C 476 for "fine grout."
- 15.4.6 Grout shall have a minimum 28-day compressive strength of 2,000psi. Slump shall be suitable for the width and depth of cavity space to be filled and shall be monitored by on-site third-party inspections. Consolidate grout by rodding or vibrating to ensure that the cavity space is completely filled.

15.5 Site Delivery and Storage

- 15.5.1 Stone shall be stored in a secure location, off the ground, and covered to prevent soiling or other damage to bedding surfaces.
- 15.5.2 Other stone masonry materials, including cementitious mortar mix materials, shall be stored in a covered, dry location. The use of cementitious materials that have become damp during storage is not permitted.
- 15.5.3 Store other accessories such as ties and anchors, in a secure location where they will not become contaminated with foreign materials such as oil and dirt.

15.6 Field Dressing/Facing and Cutting of Bluestone

- 15.6.1 The construction drawings shall specify an acceptable range and percentage of stone sizes to be used in a given location.
- 15.6.2 The stone masonry contractor is responsible for the field-facing of the quarried stone to the required fit and finish specified in the approved construction drawings.
- 15.6.3 The final minimum head and bed thickness of all stone to be used in elevated veneer wall construction shall be no less than 4" after dressing.
- 15.6.4 Store field-dressed stone as specified in 1.5.2 above.
- 15.6.5 The stone masonry contractor is responsible for cutting the stone to final size as necessary to fit specific wall locations and desired stonework pattern.
- 15.6.6 Stones that are less than 4" thick, have cracks, soft seams, mud veins, high iron content or contain other visibly defective conditions shall not be used in any locations.

15.7 Installation

- 15.7.1 All backing surfaces to which Bluestone veneer is to be applied shall be verified by the designated JMU inspector to be in compliance with all requirements before any mounting or securing of stone work.
- 15.7.2 The engineer of record shall verify that the embedded anchorage systems in backer walls have been installed at the spacing and locations shown on the approved construction drawings. Bluestone veneer shall not be installed over surfaces that do not comply with all requirements.
- 15.7.3 The JMU inspector shall verify the installation of all related materials such as flashings, cavity insulation, drainage mats and other similar items throughout the construction process.

SECTION 15 - BLUESTONE

- 15.7.4** Required mockups shall be provided and approved before any installation begins.
- 15.7.5** Keep cavity space free of excess mortar droppings. Remove excess mortar as stone is being laid to avoid bridging between back of stone and insulation board.
- 15.7.6** Provide openings, chases, recesses and other similar features as required for the installation of other trade work.
- 15.7.7** Both vertical expansion/movement joints and horizontal relief joints shall be used. Do not allow mortar to bridge across these joints.
- 15.7.8** Comply with Cold-Weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Do not build on frozen substrates or use materials that are coated with frost or ice.
- 15.7.9** Comply with Hot-Weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Protect masonry from accelerated drying due to direct exposure to sunlight or wind.

15.8 Protection of Masonry Work During Installation and Cleaning

- 15.8.1** Cover partially completed stone masonry work when construction is not in progress.
- 15.8.2** Cover tops of walls, sills and other projections with waterproof sheeting at the end of each day's work until masonry work has been completed.
- 15.8.3** Cover material shall be secured and extend at least 24" below the finished work.
- 15.8.4** Protect built-in items from mortar droppings during construction.
- 15.8.5** Clean stone masonry as the work progresses and at the end of each day.
- 15.8.6** Final cleaning of completed work after mortar has set and thoroughly cured may require the use of proprietary cleaners. Use only cleaners that are specifically designed for use on Bluestone masonry and pre-approved by JMU.
- 15.8.7** High pressure washing or cleaning of any Bluestone masonry is prohibited at JMU.

END OF SECTION 15

(16) STEEL

16.1 General

- 16.1.1 Exposed steel shall be hot-dipped galvanized to ASTM 153 standards or stainless steel.
- 16.1.2 Structural steel, bolts or other structural steel members shall not bear on any non-structural masonry veneer.

16.2 Welding/Tensioning

- 16.2.1 The engineer of record shall submit the Statement of Special Inspections with the construction drawings to provide the inspection schedule for welding of all structural joints and bolt tensioning.
- 16.2.2 At the completion of structural work, the engineer shall submit the signed and completed Statement verifying the proper installation of all structural steel members.
- 16.2.3 The welding of galvanized steel shall require a new galvanic paint coating.

16.3 Handrails/Guardrails

- 16.3.1 All campus handrails shall be anodized aluminum.
- 16.3.2 All campus handrails shall be continuous and graspable for their entire lengths.
- 16.3.3 All handrails shall be ground smooth and free of any burrs or other defects.
- 16.3.4 All handrail vertical standard shall be stainless steel to at least 4 inches above mounting surface or ground contact.
- 16.3.5 Fully grout base of handrails of core drilled into concrete. The base of the handrail shall have positive drainage away from the handrail.

16.4 Stairs/Ladders

- 16.4.1 Stair nosing shall be anodized aluminum with anti-skid devices, and use stainless steel anchors.
- 16.4.2 Exterior ladders of any sort shall be engineered for their intended use.

END OF SECTION 16

SECTION 17 - THERMAL & MOISTURE

(17) THERMAL & MOISTURE

17.1 Moisture

- 17.1.1 Foundation and slab moisture guidelines are in the Footings & Foundations section.
- 17.1.2 All components and materials subject to exterior conditions shall contain an approved moisture barrier.
- 17.1.3 The backing wall of all cavity wall systems shall incorporate a full moisture barrier into the drainage plane on their exterior side; e.g. closed-cell spray foam, rigid foam w/taped seams, etc.
- 17.1.4 All openings shall incorporate their flashing and drainage systems into the wall drainage plane.
- 17.1.5 The primary drainage plane shall be located on the outside of the continuous insulation layer.

17.2 Vapor

- 17.2.1 Walls and roofs shall be designed to be primarily vapor permeable on their interior sides.
- 17.2.2 The use of Class I vapor barriers (<.1 perm) is not allowed on the interior side of any above-grade applications. Sheet plastic is not allowed in any wall or roof assemblies. The use of foil-faced polyisocyanurate insulation is acceptable on the exterior side of cavity wall systems and roofs.
- 17.2.3 Slab and foundations shall use Class I vapor barriers.
- 17.2.4 Vinyl wall coverings (wallpaper) shall not be used in any building.

17.3 Thermal

- 17.3.1 Priority shall be given to the thermal envelope of all buildings, as it is highly cost-prohibitive to make future upgrades to these areas.
- 17.3.2 The insulation of all structural elements shall be designed to prevent their interior sides from reaching their respective dew points.
- 17.3.3 New buildings shall meet or exceed their total minimum insulation requirements through the use of continuous, exterior-side insulation.
- 17.3.4 The use of cavity insulation in steel stud walls is not allowed to meet thermal insulation requirements, not excluding any requirements for acoustics or fire ratings.
- 17.3.5 Renovation work shall meet the full insulation value with continuous insulation wherever practicable. Renovation work in existing single-wythe bluestone buildings shall use interior, direct-applied, closed-cell spray foam insulation wherever practicable.
- 17.3.6 Exterior insulation of walls shall be closed-cell spray foam or foil-faced polyiso.
- 17.3.7 All below-grade rooms (regardless of use and occupation category) shall be insulated fully and then extended either vertically or horizontally, to a minimum depth of 24" below the level of the lowest slab.
- 17.3.8 The thermal envelope shall be unbroken from the top of the footing, up the walls and around the roof to the maximum extent practicable.
- 17.3.9 Parapet walls shall be insulated on all sides and tops.

SECTION 17 - THERMAL & MOISTURE

17.4 Flashing

- 17.4.1 All flashings within a building shall be visually and chemically compatible with all other building materials in that building.
- 17.4.2 All flashings shall be incorporated into the primary drainage plane.
- 17.4.3 All flashings shall contain drip edges to remove and discharge bulk water a minimum of ½" beyond the furthest face of the wall below.
- 17.4.4 The top of all windows, doors and other such openings in the veneer shall have integral drip-edge flashing and be wept to the outside. The bottoms of all windows shall have integral flashing and be wept to the outside within the first 12" below the opening.
- 17.4.5 All horizontal projections shall be provided with protective flashing and be designed to shed and/or weep away from the building.
- 17.4.6 All flashing elements are subject to spot inspections.

END OF SECTION 17

(18) FENESTRATION

18.1 General

- 18.1.1 All exterior doors shall be fiberglass or steel.
- 18.1.2 All exterior windows shall be fiberglass or aluminum.
- 18.1.3 All exterior doors shall be provided with automatically engaging door bottom weather-strip devices.
- 18.1.4 All steel doors shall be minimum of 16 gauge and fully insulated.
- 18.1.5 All metal door frames in new buildings are to be fully welded.
- 18.1.6 All doors shall carry a lifetime manufacturer's guarantee.
- 18.1.7 All doors shall be a minimum of 3' width.
- 18.1.8 All wood doors shall be solid core with stain-grade veneer.
- 18.1.9 All door closers shall be heavy-duty cast iron with a minimum 10-year warranty. Closers shall be thru-bolted to doors at a minimum height of 80" A.F.F.
- 18.1.10 All door closers shall be provided with automatic hold-open devices.
- 18.1.11 Thresholds for trash rooms, bathrooms and custodial rooms shall be watertight.
- 18.1.12 The extensive use of curtain walls is not recommended. Where curtain walls are used, they shall be NFRC rated to provide a minimum total thermal resistance of at least R-6, including the frame and the glass.
- 18.1.13 All windows shall include shading devices.

18.2 Hardware

- 18.2.1 Provide a minimum of one automatic door opener at each bank of accessible egress doors. The open switch shall be hard-wired into the emergency circuit and be provided with battery backup.
- 18.2.2 Do not use pivot hinges and/or floor closers.
- 18.2.3 Bottom rails in glass doors shall be a minimum of 12" in height.
- 18.2.4 All exterior doors shall be insulated to at the least the minimum code.
- 18.2.5 All access panels shall be fiberglass or metal. Provide access doors to attics, roofs, crawl spaces, valves, switches, concealed devices, tunnels and/or other similar areas where JMU personnel require access for maintenance or repair activities. Provide key locks on all access openings that are exposed to the public.
- 18.2.6 Triple glazing for windows and doors is preferred.
- 18.2.7 Interior side removable sashes are preferred for all operable windows for ease of cleaning and maintenance.
- 18.2.8 All doors shall have protective kick plates.
- 18.2.9 Floor or door-mounted stops shall not be used.
- 18.2.10 Wall-mounted concave door stops shall be provided with solid blocking.
- 18.2.11 All pre-finished windows shall have protective coverings during constructions. These protective coverings shall not be removed until the project is ready for the substantial completion inspection.
- 18.2.12 Window selection shall consider the window styles of surrounding buildings and visually adjacent windows.
- 18.2.13 Skylights shall not be used in any occupiable spaces.
- 18.2.14 Plastics shall not be used in lieu of glass.

SECTION 18 - FENESTRATION

- 18.2.15 All required safety glazing shall be laminated glass.
- 18.2.16 Single glazed windows shall be a minimum of ¼" thick glass.
- 18.2.17 Glazing tint color shall coordinate with existing campus aesthetic.

18.3 Security

- 18.3.1 Provide security screens for ground level windows in residence halls.
- 18.3.2 Locking and security hardware for perimeter of all buildings shall be a type that cannot be left in an unlocked position with a key from the outside (key from outside retracts latch bolt only – latch bolt engages as key is removed from cylinder). If egress is panic exit hardware, it shall be night latch (NL) function with “dog down” capability from inside by use of hex key. Use Von Duprin with Schlage trim or Von Duprin trim, verify with project manager.
- 18.3.3 Perimeter doors not requiring panic hardware shall be of the lever design (Schlage Rhodes or Sparta Design) with Schlage ND93JD vestibule lock where (unlatched by key from outside when lever is unlocked by key in inside lever. Inside lever is always unlocked) or Schlage ND96JD storeroom where outside lever is fixed. Entrance by key only. Inside lever is always unlocked.
- 18.3.4 All stairwell corridor doors with panic devices that are fire rated shall be of the type that stays latched at all times, even when in an unlocked position. If bored-in/tubular lever type, they shall be comparable to Schlage ND93JD, (key in the inside lever locks or unlocks outside lever), except where more security is required, then lever locks shall be comparable to Schlage ND96JD, where the outside lever is FIXED, (always in a locked position and key only retracts latch bolt). All such hardware to stairwell, mechanical/electrical and chemical storage rooms shall be abrasive coated, life safety code for handicapped, particularly vision impaired.
- 18.3.5 All locks on mechanical/electrical rooms and janitor closets shall be Schlage ND96JD, (fixed lever) in Rhodes or Sparta Design with a storeroom function.
- 18.3.6 All regular classroom locks shall be of the type that can only be locked from inside with a locking button and only a key shall unlock door from the outside, such as a Schlage ND94PD, Rhodes or Sparta Design.
- 18.3.7 All residence hall dormitory room locks shall be standard core ND92PD with vandal-guard function.
- 18.3.8 All other locks shall be as directed by owner, e.g. storeroom, passage or security alarm devices.
- 18.3.9 All keys shall be provided to the JMU locksmith, to include all construction keys, grandmaster, master and change keys.
- 18.3.10 All permanent key cylinders shall be purchased from Schlage by the JMU lock shop outside of the construction contract.
- 18.3.11 Card Reader Door Frames shall have properly sized mortar guards. Mortar guards shall be located at the electric strike, electric hinge, power transfer and door position switches. Mortar guards shall have a ½" conduit knockout to allow for conduit termination. All door frames designated as future card reader doors shall also have mortar guard as described.

END OF SECTION 18

(19) ROOFING

- 19.1** Snow guards are required for all roofs with a slope of 6 in 12 or greater and over all entrances regardless of slope.
- 19.2** Entries and doorways shall be protected from falling snow, ice, and water. Heat tape shall not be used.
- 19.3** Clay tiles shall be Spanish tiles as manufactured by Ludowici Celadon, or approved equal to match existing clay tile roofs.
- 19.4** Metal for flashing and drip edge shall be copper, not less than sixteen ounces (16oz.). When flashing occurs extensively in connection with aluminum items, stainless steel (grade 304) or aluminum flashing not less than 0.032" thick shall be used. All flashing joints shall overlap 4" minimum and shall be sealed with a manufacturer approved elastomeric sealant.
- 19.5** Roofing system flashing and miscellaneous sheet metal work, shall be installed in accordance with the manufacturer's published instructions and furnish a 50 year guarantee.
- 19.6** Low-slope and flat roofing to be 60-mil, fully adhered, single ply EPDM by Carlisle or Firestone.
- 19.7** Provide concealed EPDM-gasketed fasteners in all flashing. Fastening shall only occur on the vertical portions of flashings.
- 19.8** Roof access shall be provided from inside the building to accommodate inspections, repairs, and drain cleaning. Permanent ladders or stairs shall be provided as necessary to access each roof level.
- 19.9** Bluestone gutter downfalls shall be copper. All downfalls shall be provided with an accessible cleanout at ground level.
- 19.10** All roofing shall have deck pads from roof access points to all serviceable rooftop mounted units. Construction drawings shall clearly show these traffic pad locations and dimensions. Enlarge roof pad area at roof access points for equipment staging.
- 19.11** All roof drain covers shall be metal.
- 19.12** Skylights shall not be used.
- 19.13** All roofs shall have utility outlets located no more than 200' apart.
- 19.14** Whenever possible provide a frost-protected hose bib on each roof.
- 19.15** Roof covering choice shall consider the views from higher elevated structures.

END OF SECTION 19

(20) LIFE SAFETY

20.1 General

- 20.1.1 At the completion of the project and/or final acceptance testing of the sprinkler system a copy of the certificate showing how the system functioned during the trip test shall be issued to the University.
- 20.1.2 Only one (1) manufacturer shall be specified for all fire stopping applications throughout the project.
- 20.1.3 Provide removal-warning label at all fire-stopping installations.

20.2 Fire Protection Systems

- 20.2.1 Provide spares of any input modules or relays that were used in the system.
- 20.2.2 Use the JMU standard audio files (179/180) for fire alarm systems with voice evac (Simplex has on file).
- 20.2.3 Cat 15 key or Simplex "B" key for all panels.
- 20.2.4 Provide true "as-built" with conduit pathways, j-boxes, sprinkler valves, drain points and labeled, addressable fire alarm devices.
- 20.2.5 Provide a fire alarm input module to monitor the AC power of the sprinkler air compressor.
- 20.2.6 Provide floor drain in all sprinkler valve rooms.
- 20.2.7 Add a heat detector in remotely located fire pump rooms to monitor for low temp/freezing condition.
- 20.2.8 Bolt down all incoming sprinkler lines from thrust block to flange with approved fasteners.
- 20.2.9 Install hydraulic placards at sprinkler riser with engraved data, not permanent marker.
- 20.2.10 Copper compression fittings shall not be used on sprinkler air compressor feeds.
- 20.2.11 All dry valves to be manually resettable without removing face bolts.
- 20.2.12 Connect fire pump controller to building generator.
- 20.2.13 Use Simplex addressable releasing device rather than a third party releasing panel.
- 20.2.14 Provide spare escutcheon plates for each type of escutcheon used in the building.

END OF SECTION 20

(21) BUILDING AUTOMATION SYSTEMS (B.A.S.)**21.1 General**

21.1.1 *Siemens Building Technologies* is the pre-approved BAS vendor and shall provide a bid package to the following JMU BAS representative:

Rodney Lam
 Facilities Management Building
 MSC 7007 Harrisonburg Va. 22807
 Phone – (540) 568-6905

21.1.2 Internet access to the JMU BAS network is strictly limited to JMU employees. No contractors, commissioning agents or anyone else shall be given access at any time or for any reason.

21.1.3 The university shall evaluate and approve in writing to the general contractor acceptance of the approved automation provider for the specific project. At this time the general shall use the quote provided by the approved Building Automation Systems contractor in their bid processes for the project. The contractor shall provide the following information in their bid package:

21.1.3.1 An automation system configuration diagram which indicates the model, type, quantity and location of the proposed BAS panels.

21.1.3.2 A network configuration diagram which includes locations for all switches, hubs, media converters and network paths.

21.1.3.3 A breakdown of the BAS contractors proposed cost including materials, markups, subcontractors, labor and training.

21.1.3.4 A complete input/output summary including cost per point broken into major types. (I.e. AI, AO, BO, BI, etc...).

21.1.3.5 Control schematic drawings and sequence of operations.

21.1.3.6 Descriptions of any major additions to the head end or operator interface hardware.

21.1.3.7 Total quote of the project with a written statement of any exceptions taken.

21.2 Quality Assurance

21.2.1 Materials shall be the best of their respective kinds. All materials shall be new. Work provided by the BAS contractor for each section of this specification shall be constructed and finished in every part in a substantial and workmanlike manner. Items necessary for the completion of the work and the successful operation of a product shall be provided even though not fully specified or indicated in each section.

21.2.2 Materials furnished under this section shall be standard cataloged products of recognized manufacturers regularly engaged in the production of such material and shall be the latest design.

21.2.3 Upon completion of the installation, the BAS contractor shall verify by demonstration to the owner that the system is fully functional, installed in accordance with the plans and specifications and calibrated to operational limits specified. Acceptable documentation and test procedures shall be as approved on the initial project

submittals. BAS contractor and JMU Building Automation personnel shall perform a complete point to point checkout to verify proper installation and operation, to include all control processes. The warranty period shall not begin until completion of the checkout process including correction of any problems found and all graphics are complete and installed.

- 21.2.4 The BAS contractor shall be responsible for all necessary revisions and upgrades to all software as required to provide a complete and workable system consistent with the letter and intent of the specification. Final installed software shall be of the manufacturer's latest available release level.
- 21.2.5 The BAS contractor shall provide \$5,000 in training funds on all projects with a contract value of \$100,000.00 or more. On contracts less than \$100,000.00, no training funding shall be required. JMU shall utilize these funds at their discretion to provide training in HVAC, Automation and Energy related fields.
- 21.2.6 JMU shall be considered a preferred customer with or without a maintenance agreement with the contractor.

21.3 Submittals

- 21.3.1 Provide complete shop drawings, catalog data sheets, schematics and other data necessary to fully describe and substantiate compliance with these specifications for all control items and systems included or connected as part of this system. On-site work shall not begin until submittals have been approved by the Engineer and JMU.
- 21.3.2 The exact location for all devices such as down duct static sensors, space static sensors and floor return dampers shall be noted on the final drawings.
- 21.3.3 The BAS contractor shall provide "as-built" drawings, sequences of operation, graphics and control processes in electronic format, (1) 11"x17" hard copy and (1) laminated copy to be placed at the panel locations.

21.4 Coordination with Contractors

- 21.4.1 The BAS contractor shall coordinate the installation of all control devices and shall verify supporting work by others such as sensor wells, pressure taps, orifice plates, access panels, electric power supplies and all other related items required to support proper BAS installation, operation and maintenance.
- 21.4.2 All dampers, valves, immersion wells and flow meters for the BAS shall be furnished by the BAS contractor for installation by the mechanical contractor.

21.5 System Operations

- 21.5.1 The BAS contractor shall provide material and labor to perform start-up of each piece of equipment or system prior to the beginning of test, adjust and balance procedures.
- 21.5.2 The BAS contractor shall provide all information and assistance necessary to support commissioning and balancing.
- 21.5.3 The BAS contractor shall provide periodic adjustment as necessary to ensure proper operation of the mechanical systems after occupancy until the system is accepted.
- 21.5.4 The BAS contractor shall not connect any new projects to the JMU BAS network before project completion. JMU BAS authorization prior to connection is required.

21.6 Operation & Maintenance Data

- 21.6.1 Provide two (2) copies of Operation & Maintenance manuals. Manuals shall include required maintenance procedures for each system provided and a list of recommended spare parts. "As-built" drawings with the sequence of operation included on the same page with the respective control diagrams shall be provided with the manuals.
- 21.6.2 Provide written documentation of all setup values for each meter installed, to include electric meters, steam meters, and water meters and any associated devices such as flow calculation computers, etc.

21.7 Guarantee of Work

- 21.7.1 The BAS contractor shall guarantee the system to be free of defects in workmanship and/or material for a period of one (1) year from the date of acceptance. All deficiencies shall be corrected in a timely manner and without additional expense to JMU.

21.8 Approved Manufacturers

- 21.8.1 All main BAS hardware components shall be manufactured by *Siemens Building Technologies*.
- 21.8.2 All actuators shall be *DDC* and manufactured by *Siemens* or *Belimo*.
- 21.8.3 All other components not made by *Siemens* should be pre-approved by JMU BAS.

21.9 Hardware Requirements

- 21.9.1 Management level network devices (MLND) shall be capable of stand-alone operation and/or network operation as required. These devices include *Siemens MBCs*, *PXC Modular* and *PXC Compact* devices.
- 21.9.2 All BAS systems shall include one or more MLNDs and shall be capable of normal operation in any environment that ranges from 32°F to 122°F (0-50° C) with 0-90% relative humidity. Hazards like extreme airborne dust, explosive or corrosive vapors and other similar conditions shall require all controllers to be located in a more favorable environment or protected by a suitable enclosure that is environmentally maintained within the identified limits.
- 21.9.3 Each MLND shall be dedicated for 120V AC, 60 Hertz and shall be fused for protection.
- 21.9.4 Each power circuit serving MLNDs shall be dedicated, shall energize no other device and contain a properly sized breaker.
- 21.9.5 Power for the MLNDs shall be provided by the electrical contractor.
- 21.9.6 A MLND shall be provided in all main mechanical rooms.
- 21.9.7 Each MLND shall have a minimum of 10 spare points to be used by the owner at a later date. These point shall include 2 binary in, 2 binary out and 4 analog out. This point is negotiable on a case by case basis and BAS contractor shall obtain written authorization from the JMU BAS representative.
- 21.9.8 Each field level network device (FLND) shall be capable of normal operation as required for MLNDs.

SECTION 21 - B.A.S.

- 21.9.9 Each FLND shall use *Siemens* standard sensors, transducers and other input/output devices.
 - 21.9.10 Each FLND shall be designed to operate with 120V AC, 60 hertz and be fused for protection.
 - 21.9.11 Each power circuit serving a FLND shall be dedicated, shall energize no other device and contain a properly sized breaker.
 - 21.9.12 Power for the FLND shall be provided by the electrical contractor.
 - 21.9.13 All devices shall be labeled.
 - 21.9.14 All actuators shall be manufactured by *Siemens*. If *Siemens* actuators are not available *Belimo* may be substituted.
 - 21.9.15 The BAS contractor shall provide a pre-approved terminal for system access at each FLND. If more than one FLND is in a room, then only one terminal is needed.
 - 21.9.16 All BAS panels shall reside in the same room of the equipment being served.
- 21.10 BAS Controlled HVAC**
- 21.10.1 All direct expansion (DX) cooling and packaging chillers should be staged and controlled by on-board, native controls when possible. The BAS contractor shall provide an enable, status and alarm point for these units. BACnet communication when available is acceptable.
 - 21.10.2 All pre-heat, heating or re-heat coils shall be hot water.
 - 21.10.3 The preferred heat recovery systems are tube in tube style.
 - 21.10.4 Refrigerant monitors shall be *Bacharach* brand. All strobes associated with the refrigerant monitor shall be amber in color. Refrigerant monitors shall be connected to the JMU automation system.
- 21.11 Network**
- 21.11.1 The BAS contractor shall provide all network devices necessary to connect to and communicate with the JMU BAS network. The devices include, but are not limited to, switches, hubs and media converters.
 - 21.11.2 The network devices shall be *Allied Telesis* brand.
 - 21.11.3 The BAS contractor shall receive pre-approval for all network hardware locations from JMU BAS prior to installation.
- 21.12 Head End Requirements**
- 21.12.1 The BAS contractor shall provide a color graphic for each mechanical system and a floor plan graphic for each floor. All information shall be displayed in real time dynamic fashion. All new graphics shall be similar in style to the existing system graphics and shall be pre-approved by JMU BAS supervisor.
 - 21.12.2 Each VAV, CAV or similar type equipment point names shall include the associated AHU number.
 - 21.12.3 Each AHU, RTU or similar type equipment shall have a detailed description of all areas served, the type of associated equipment as well as the physical location of the unit; e.g., AHU #1 serves 1st and 2nd floor VAV system, and is located in the main mechanical room in the basement.

SECTION 21 - B.A.S.

- 21.12.4 All lead, lag and standby controls, including chillers, pumps and boilers, shall be able to be switched by changing the state of a single point mapped to the head end.
- 21.12.5 Programming style should be consistent with existing JMU programs. The best programs are the most simplistic while still being able to provide the control needed. Adaptive loops, \$LOC variables and subroutines are not permitted.

21.13 Field Installation

- 21.13.1 All wiring, regardless of voltage, required for proper installation and operation of the BAS components shall be furnished and installed by the BAS contractor.
- 21.13.2 All wiring shall be labeled at both ends with stand-up type labels.
- 21.13.3 All wiring in mechanical and electrical equipment rooms or other areas where exposed shall be installed in EMT or similar type conduit. Wiring exposed in occupied areas shall be installed in wire mold.
- 21.13.4 The BAS contractor shall be responsible for the wiring of any BAS air compressor only if there is no electrical contractor on the project.
- 21.13.5 All safeties such as freeze stats, fire stats, smoke detectors, etc. shall be hard wired to stop their respective equipment and return all controlled devices to their normal position.
- 21.13.6 All relays, CTs, Eps, Pes or similar devices shall be installed in readily accessible locations. All relays shall have LED indicators and should be mounted in viewable locations.
- 21.13.7 All current transformers shall be split-core, *Hawkeye* brand.
- 21.13.8 The BAS contractor shall remove all existing controls and associated wiring or tubing no longer needed. Abandoning in place is not acceptable.

21.14 Variable Frequency Drives (VFD)

- 21.14.1 The only approved manufacturer of variable frequency drives is *Danfoss Graham*. Currently, the only approved model is the VLT HVAC. *Trane* VFDs that are rebranded *Danfoss* drives are not approved. Exact VFD specifications are available upon request.

21.15 Utility Metering

- 21.15.1 The BAS contractor shall be responsible for installation of all piping, valves and labor necessary to install utility meters as specified unless the mechanical contractor is specified. The BAS contractor shall coordinate.
- 21.15.2 Steam meter components shall be pre-approved by the JMU Power Plant manager.
- 21.15.3 Domestic water meters shall be *Badger Recordall Compound Series*. Computers shall be *KEPtrol* model #KFC8A3A2C3.
- 21.15.4 *Square D* is the preferred provider for electric meters.
- 21.15.5 All meters shall be networked with the JMU energy network and provide real-time readings.

END OF SECTION 21

(22) MECHANICAL

22.1 Design

- 22.1.1 The indoor design temperature for the cooling season shall be 74°F.
- 22.1.2 The indoor design temperature for the heating season shall be 72°F.
- 22.1.3 Outdoor design temperatures shall use the 2% cooling season temperatures from ASHRAE Fundamentals.
- 22.1.4 Outdoor design temperature for heating season shall use 0°F.
- 22.1.5 Cooling season equipment shall be principally designed to consider the effects of part-load cooling season conditions and their ability to provide proper dehumidification. Buildings or zones with extended unoccupied time; e.g. academic or dorm buildings in the summer, shall be able to maintain 50% RH at an 85°F setback temperature.
- 22.1.6 All equipment and duct design for academic buildings shall provide for the potential for the change of use within a given space; i.e. classrooms that change to computer labs, etc. Takeoffs from the main trunk shall be located in an accessible area.
- 22.1.7 Equipment and ducts shall be located within the thermal envelope of the building whenever practicable.

22.2 General

- 22.2.1 NEMA premium efficiency motors shall be used on all HVAC systems at JMU.
- 22.2.2 Any cooling tower system, AHU or other piece of equipment that requires a ladder greater than 8' tall to service shall be provided with permanently installed ladders and service platforms.
- 22.2.3 Contractors shall provide training and the manufacturer's service manuals for all equipment installations.
- 22.2.4 Unit information labels and stickers shall never be painted over or covered in any way.
- 22.2.5 The location of mechanical equipment above acoustical ceilings shall be identified by small laminated plastic (black & white signs attached to ceiling grid).
- 22.2.6 Include noise criteria for all fan units. (See section 2.4 for acoustical requirements.)
- 22.2.7 Duct lining is prohibited, except as required for sound attenuation.
- 22.2.8 Buildings shall always be designed to use an economizer mode when outside air is below 50°F for cooling in the winter. Buildings with fan coil units shall be able to utilize some means of economized cooling and be able to maintain the set point.
- 22.2.9 Design hot water system with two-way valves when using primary and secondary hot water loop.
- 22.2.10 Hot water systems shall be isolated from each other; i.e. Fan coil units, AHUs and perimeter radiant panels shall be on separate systems to allow for different reset schedules.
- 22.2.11 No dielectric unions shall be used. Use dielectric pipe nipples in their place.
- 22.2.12 Small HVAC systems that are not connected to the BAS system shall have a thermostat with automatic changeover installed. The thermostat shall automatically switch from heating to cooling and back to satisfy the space heating and cooling needs.
- 22.2.13 All indoor and outdoor equipment areas shall have lighting that can be turned on by the workers when needed. This includes HVAC equipment areas on a roof, enclosures and any such areas where ambient light is not available.

SECTION 22 - MECHANICAL

- 22.2.14 During construction and renovations the HVAC systems shall be turned off and all supply, return and equipment openings shall be covered. If the area of construction or renovation requires heating or cooling during the project, it shall be the responsibility of the contractor to provide and install temporary HVAC systems to meet this need. Only when the project is complete shall the building HVAC system's operation be restored. If air filters need replacement or equipment, duct and/or coils need cleaning, it shall be the responsibility of the contractor.
- 22.2.15 Paint all un-insulated piping, duct work and supporting structures that are exposed to outdoor weather conditions.
- 22.2.16 Pipes and conduits shall not cross any designated roof walkways. If they must cross a walkway, a permanent accessible and readily removable platform and/or stairs shall be provided over the piping.

22.3 Location and Equipment

- 22.3.1 The A/E shall provide safe access and manufacturer's recommended working clearances for all equipment.
- 22.3.2 In phased projects, mechanical rooms shall be sized to include equipment for all future phases.
- 22.3.3 Removal and/or replacement of the largest piece of equipment shall not require the removal of any permanent walls or other functioning equipment.
- 22.3.4 Mechanical equipment, piping and conduit shall provide acoustical isolation from walls, floors and ceilings.

22.4 Metering

- 22.4.1 Meters shall be insulated at each building on each utility and shall be capable of showing cumulative energy demand and of measuring the maximum and minimum anticipated flow rates.
- 22.4.2 Provide a minimum of 2 hours of training on meter set-ups to JMU BAS personnel; Contact BAS supervisor at (540) 568-6905.
- 22.4.3 Provide written documentation of all set up parameters for electric, steam/water meters, flow calculators and other similar metering devices.

22.5 Ventilation/Outdoor Air (OA)

- 22.5.1 Outdoor air shall be determined by ASHRAE 62.1 standards.
- 22.5.2 OA shall be set so as not to exceed the requirements of ASHRAE 62.1.
- 22.5.3 Assembly areas shall be equipped with dedicated AHUs with modulating OA and RA damper controls. Dampers shall be set to no less than the minimum OA volume and be allowed to modulate from minimum to fully open between 800ppm and 1200ppm of CO₂ return air concentration.

22.6 Water Treatment

- 22.6.1 JMU has a contract with a vendor to provide water treatment for all of our heating water, cooling water, and cooling tower systems.

SECTION 22 - MECHANICAL

- 22.6.2 Chemicals for the cleaning/flushing of systems, inhibitors, biocides, chemical controllers, glycol and feed systems are part of this contract.
- 22.6.3 Any projects that require HVAC water treatment shall use the JMU contracted vendor for treatment services and supplies.
- 22.6.4 All closed water loops shall be flushed prior to their operation.
- 22.6.5 All closed water loops shall have a 10" filter feeder installed to allow filtering of closed loop as well as feeding chemicals. Filter Feeders are available through the JMU water treatment provider.
- 22.6.6 Cooling tower chemical controls for water treatment shall be installed. Chemical control system shall be designed to be inter-locked with condenser water pump.
- 22.6.7 Chemical feed for cooling towers shall be piped into a chemical station set up to include the water chemistry conductivity sensor, injection of chemicals and a sampling port for taking weekly samples. This chemical station shall have isolation valves that are located at the chemical station.
- 22.6.8 Cyclonic separators shall be installed to help remove heavy solids from the cooling tower water. An independent electronic timer that is interlocked with the condenser pumps shall be used to control the blow down valve. A full-flow blow down valve shall also be installed.

22.7 Cooling Towers

- 22.7.1 Hot and cold water basins and distribution boxes shall be constructed with stainless steel.
- 22.7.2 All waterlines exposed to cold weather shall be heat traced.
- 22.7.3 Basin heaters shall be installed.
- 22.7.4 Float valves are the preferred tower makeup water control. A pressure reducing valve shall be installed in series with the makeup water valve.
- 22.7.5 Ladders, cages, rails and catwalks shall be installed for safe access to the tower.
- 22.7.6 Proper passivation of the tower shall be performed by the cooling tower manufacturer and the JMU water treatment provider.
- 22.7.7 All cooling towers shall be started by the cooling tower manufacturer's service representative. A JMU HVAC shop representative shall be present for the startup. Prior notice of 72 hours shall be given for all cooling tower start-ups.

22.8 Air Handling Unit (AHU) and Roof Top Unit (RTU)

- 22.8.1 All HVAC air handlers located in a building above the ground floor level should have water tight curbing located around them with floor drain inside curbing. Water circulating pumps should be inside of curbing. This does not apply to RTUs.
- 22.8.2 Water tight pans shall be provided under all air handling units with coils when located overhead. Pans shall be piped to a drain and cannot share the same piping as the AHU.
- 22.8.3 Air handling units that are larger than 20 tons in cooling capacity shall have lights installed in the interior of units with a switch on outside of unit with pilot light.
- 22.8.4 Air handling units shall be of double wall construction.
- 22.8.5 Service access panels shall be constructed with side-hinged doors.

SECTION 22 - MECHANICAL

- 22.8.6 Shall have stainless steel drain pans with pans sloped to drain all water from pan.
- 22.8.7 Install thermometers and pressure gauges at pumps and AHU's water lines. Thermometers should be of solar power variety.
- 22.8.8 JMU shall provide an updated BAS specification to each project.
- 22.8.9 All fans shall be dynamically and statically balanced at factory.
- 22.8.10 Contractor to provide two (2) sets of 30% efficient, pleated-type filters for each unit requiring filter sections.
- 22.8.11 All dampers shall be rated for a maximum leakage rate of <1% of nominal CFM at 1" W.C.
- 22.8.12 Air blender shall be provided with all units using outside air not preheated to allow proper mixing of outside and return air.
- 22.8.13 Outdoor air intakes shall use ½" hardware cloth instead of insect screens.
- 22.8.14 Access panels shall be a minimum of 18"x18" with a hinged door. Access doors shall be able to open fully and be installed in such a way as to be free from sharp edges and protruding screws.
- 22.8.15 Do not use face and bypass dampers.
- 22.8.16 All AHU coils shall be filtered to include pre-heat, pre-cool and ERV coils.
- 22.8.17 DX cooling in a VAV or multi-zone system is not acceptable.
- 22.8.18 AHU's shall have preheat coils on outside air and should preheat outside air from 0°F to 45°F before entering the mixing chamber. Do not use separate ducting for minimum outside air. Use maximum outside air duct being used for economizer with minimum position on dampers for min OA.
- 22.8.19 On AHUs, reheat boxes, unit ventilators and any piece of equipment with the capacity to heat or cool, the heating valve or damper shall be normally open and the cooling valve or damper should be normally closed.
- 22.8.20 RTUs with exposed ductwork above roof grade shall have duct work insulated in a fashion that the top of the duct insulation is pitched to allow water to drain off the top of a square duct. Wrapping duct insulation in either metal jacket or rubber jacket is acceptable.
- 22.8.21 RTUs shall have ductwork designed in a fashion as to not block the access to units. Crawling under ductwork or having to climb over ductwork is unacceptable to access a unit.
- 22.8.22 If unit mounted disconnects are used, another means of disconnect shall also be included that is separate from the AHU or RTU, but located adjacent to the AHU or RTU.
- 22.8.23 Water circulation pumps shall not be installed between the suspended ceiling and the RTU.

22.9 Fan Coil Units (FCU)

- 22.9.1 All FCUs shall have a filter rack or filter grill capable of using an air filter at least 1" thick, and is required to use a pleated type with 30% efficiency.
- 22.9.2 All ceiling mounted ducted fan coils shall use a filter grill.
- 22.9.3 All ceiling mounted FCUs shall be equipped with a float switch that shall stop the cooling operation in the event of a primary condensate pan overflow.

SECTION 22 - MECHANICAL

- 22.9.4 Sound blankets of any kind should never be used on ceiling mounted fan coil units.
- 22.9.5 FCU condensate drains shall be piped to a gravity drain. Condensate pumps shall be avoided when possible.
- 22.9.6 FCU mounted disconnects are allowed, however, another means of disconnect shall be included that is separate from the fan coil and is located adjacent to the fan coil.
- 22.9.7 FCUs in dormitories shall be designed without control valves using "wild coils." The thermostat shall cycle the fan to satisfy space temperature.

22.10 Variable Air Volume (VAV)

- 22.10.1 Fan powered boxes are not acceptable. Use induction reheat or terminal boxes.
- 22.10.2 Zone control shall be used for optimization of equipment.
- 22.10.3 Reheat coils shall be a two-pass design.
- 22.10.4 Reheat coil shall be equipped within isolation valves, strainer, flow control and control valves.
- 22.10.5 All systems shall have variable frequency drives (VFD) on the fan(s).

22.11 Exhaust and Make-up Air Fans

- 22.11.1 Any exhaust system set up with a HRV or ERV coils shall have a filter rack immediately prior to the coil
- 22.11.2 Any exhaust system set up with a heat or energy recovery coil shall have an access door to access the coil for cleaning.

22.12 Pumps (heating, chilled and condenser water)

- 22.12.1 All pumps shall have isolation valves installed.
- 22.12.2 All pumps shall have strainers installed on the suction inlet.
- 22.12.3 Condenser water pumps shall be constructed from stainless steel.
- 22.12.4 Pumps shall be installed at floor level, with the exception of pumps on AHUs. Consideration for other locations shall depend on the pump's accessibility and water damage prevention measures during a pump failure.
- 22.12.5 Cooling tower chemical pumps shall be provided by the JMU water treatment provider and they shall also specify how such pumps are to be installed.
- 22.12.6 Provide redundant pumps for all building heating water, chilled water, and condenser water systems.
- 22.12.7 Install thermometers and pressure gauges at all pumps. Thermometers should be of the solar powered variety.

22.13 Split System (HVAC and Refrigeration)

- 22.13.1 Variable refrigerant volume (VRV) and variable refrigerant flow (VRF) systems are prohibited and shall not be installed on the JMU campus.
- 22.13.2 Prior to equipment installation all refrigerant lines shall be capped and never open to the environment.
- 22.13.3 Refrigerant lines shall be sized and installed as per the manufacturer's installation instructions.

SECTION 22 - MECHANICAL

- 22.13.4 Brazed connections are preferred on all refrigerant lines on HVAC split systems. If other means of connecting line are used, they shall be of an approved method by the equipment manufacturer.
- 22.13.5 A standing pressure test of all refrigerant piping shall be performed while the lines are fully accessible and before the equipment is connected. All refrigerant lines shall hold a nitrogen charge of 500psig for 24 hours. An approved JMU representative shall witness this pressure test. Once the test is completed successfully, the lines may be covered and the equipment installed. On existing buildings when split systems are added, this pressure test may be waived if approved by JMU HVAC department.
- 22.13.6 Final refrigerant line connections at the equipment shall also be tested for leaks with a standing pressure test before insulating, evacuation and charging. The final connections shall hold a nitrogen charge for 24 hours. The nitrogen charge shall not exceed the manufacturer's test pressure rating. An approved JMU representative shall witness this pressure test. Once the test is completed successfully the lines may be insulated and you may proceed with evacuation and charging.
- 22.13.7 Split systems shall be properly evacuated to remove air and moisture. All systems shall be evacuated as per the manufacturer's specifications.
- 22.13.8 After the system is charged, labeling shall be installed on the condensing unit with system full charge and refrigerant type listed.
- 22.13.9 Labels shall be installed that identifies which equipment (condensing unit and evaporator) that operate together as one system. Power source labeling is also needed.
- 22.13.10 Water tight auxiliary drain pans shall be required when split system air handlers are installed above finished building structures.

22.14 Air Filters

- 22.14.1 All air filters shall be a pleated type filter with a 30% efficiency. Exceptions will be considered for equipment that requires the use of specialty filters such as bag or HEPA filters.
- 22.14.2 All coils and energy wheels shall be filtered.
- 22.14.3 Two (2) additional set of air filters shall be provided on all HVAC projects.
- 22.14.4 We purchase air filters under a contract and you are welcome to contact our filter supplier to purchase the type and quality of filter that we use.

22.15 Pipe Insulation

- 22.15.1 *Armflex AP* insulation shall be used on copper pipes for temperatures <180°F.
- 22.15.2 Fiberglass insulation shall be used for temperatures >180° F.
- 22.15.3 Armflex and closed cell insulation should never be used on black pipe that is carrying dual temperature or chilled water.
- 22.15.4 All pipe insulation that is exposed to outdoor weather shall be covered with an aluminum jacket and sealed with silicone caulk.
- 22.15.5 Other types of pipe insulation shall be considered on the basis of pipe construction, location and temperature of liquid in the pipe.

SECTION 22 - MECHANICAL

22.16 Refrigeration (Ice makers/Water Filters)

- 22.16.1 Air-cooled icemakers shall be installed per manufacturer's ventilation requirements.
- 22.16.2 Icemakers shall never be installed in unheated spaces.
- 22.16.3 Icemakers shall be installed with a JMU-approved water filter.
- 22.16.4 Pre-manufactured line set equipment shall follow the manufacturer's installation instructions.

22.17 Refrigerant Monitors

- 22.17.1 Only *Bacharach* monitors shall be used.
- 22.17.2 All strobes used in conjunction with the refrigerant monitor shall be amber in color.
- 22.17.3 Refrigerant monitors shall be interfaced with the JMU BAS and is part of the BAS specifications.
- 22.17.4 JMU has received an exemption and is not required to have self-contained breathing apparatus or SCBA at the mechanical room entrance. Further questions regarding SCBA requirements can be directed to the office of University Risk Management.
- 22.17.5 The signs on the mechanical room doors shall say the following:

DO NOT ENTER!

POTENTIAL OXYGEN DEFICIENT ATMOSPHERE WHEN ALARM IS ACTIVE.
PLEASE NOTIFY PUBLIC SAFETY AT 568-6911 AND FM WORK CONTROL AT
568-6101 IMMEDIATELY FOR PROPER RESPONSE.

22.18 Refrigerant Management

- 22.18.1 All refrigerant work shall comply with EPA Section 608 regulations.
- 22.18.2 Properly certified technicians shall perform all work and shall have proof of certification with them at all times when they are on the job site.
- 22.18.3 Documentation for all technician certifications shall be filed with the JMU HVAC manager.
- 22.18.4 Documentation of all refrigerant activity shall be submitted to the JMU HVAC manager. Forms and instructions are available from the JMU HVAC manager and supervisors.
- 22.18.5 The JMU HVAC shop shall provide all cylinders needed for the recovery of refrigerant for disposal. A two (2) week notice is required prior to recovery of refrigerant. JMU shall not provide any recovery equipment for contractor use.

22.19 Chillers

- 22.19.1 Chillers with open drive compressors shall not be used.
- 22.19.2 Removable sound blankets and sound enclosures for sound attenuation shall not be used.
- 22.19.3 We encourage the use of oil-free centrifugal chillers.
- 22.19.4 R-134A, R-123 and R410A may be used. Environmental issues have been driving refrigerant types used and phase out times. Chillers using new refrigerants shall be considered with approval from the JMU HVAC department. Environmental impact, equipment reliability, refrigerant availability, safety and energy efficiency are issues that shall be considered when making chiller selections.

SECTION 22 - MECHANICAL

- 22.19.5 Chillers using variable speed technology for capacity control may be used.
 - 22.19.6 Scroll compressors shall not be used chiller capacities >145 tons.
 - 22.19.7 Chillers over 145 tons shall have screw or centrifugal compressors.
 - 22.19.8 Dual refrigerant circuits and compressors shall be considered. This gives redundancy and better control at low loads.
 - 22.19.9 Water-cooled chillers with the capability to control the condenser water pump, chilled water pump, tower by-pass valve and cooling tower fan, shall provide the control.
 - 22.19.10 Air-cooled chillers shall use a primary and secondary pumping system. The chiller shall control the primary chilled water pump.
 - 22.19.11 All chillers shall be controlled by the JMU BAS system.
 - 22.19.12 All water cooled chillers shall have a cooling tower by-pass valve installed.
 - 22.19.13 All chiller shall be started by the chiller manufactures service representative. A JMU HVAC shop representative shall be present for the startup. Prior notice of 72 hours shall be given for all chiller start-ups.
 - 22.19.14 Manufacturer shall provide training for two JMU HVAC technicians at their offsite training facility.
 - 22.19.15 Chiller mounted disconnects are acceptable, however, another means of disconnect shall also be included that is separate from the chiller, but located adjacent to the chiller.
 - 22.19.16 Pressure gauges and thermometers shall be installed on chiller evaporators and water cooled condensers. Thermometers shall be solar powered.
 - 22.19.17 Air cooled chillers shall have manufacturer installed freeze protection.
 - 22.19.18 All evaporators and water cooled condensers shall have isolation valves and drain valves installed. They shall also have a 1.5" weld-o-ley installed with a plug between each of the isolation valves and the heat exchanger.
 - 22.19.19 Some buildings may need to be designed with emergency hookups for rental chillers. When a building is being designed, the question will need to be asked whether the building is mission critical and shall require any emergency connections.
- 22.20 Variable Frequency Drives (VFD)**
- 22.20.1 VFDs shall be interfaced with the JMU BAS.
 - 22.20.2 All VFDs shall be *Danfoss VLT* brand.
- 22.21 Glycol**
- 22.21.1 Inhibited Propylene Glycol shall be used where freeze protection is required. Some applications may require "food-grade" propylene glycol to be used.
 - 22.21.2 33% glycol should give adequate freeze protection on most systems.
 - 22.21.3 Glycol and feed systems can be purchased from our water treatment supplier.
 - 22.21.4 A hose bib shall be installed within 20' of the glycol feed tank.
 - 22.21.5 If a system requires glycol, it shall also have an automatic feed system.
 - 22.21.6 Closed-loop system relief valves shall be piped back to the make-up tank.
 - 22.21.7 The low glycol level sensor on the feed tank shall be wired into the BAS.

SECTION 22 - MECHANICAL

22.22 HVAC Controls

- 22.22.1 HVAC systems shall be interfaced with the JMU BAS for control and monitoring. Smaller units, split systems and thru-wall units may be exempt and will use unit mounted controls.

22.23 Main Frame IT Computer Room HVAC Systems

- 22.23.1 All rooms shall have 50% capacity of redundant cooling.
- 22.23.2 Chilled water may be used from an independent chiller that is capable of operating continually.
- 22.23.3 All IT room HVAC systems shall be connected to the emergency generator, including the back-up (or redundant) system.
- 22.23.4 IT main frame computer HVAC systems shall be entirely independent and in no way connected with any other building systems.
- 22.23.5 Infrared humidifiers are the preferred type of humidifier to use in IT HVAC systems.
- 22.23.6 All HVAC systems and room conditions shall be monitored by the JMU BAS.

22.24 Environmental Chambers

- 22.24.1 Environmental chambers are used to meet the program needs of the end user in a building. In most cases, the JMU Refrigeration shop will provide service and repair after the chamber is installed and put in operation.
- 22.24.2 Air-cooled equipment shall never be installed without proper ventilation. Refer to the manufacturer's installation requirements for needed ventilation.

22.25 Specialty HVAC Systems Applications

- 22.25.1 Specialty systems may need to be designed to meet the program needs of the end user in a building. In most cases, the JMU HVAC shop will provide service and repair after the system is installed and put in operation.
- 22.25.2 All specialty HVAC systems shall be tested, balanced and commissioned to ensure that the system will perform as designed.
- 22.25.3 All specialty HVAC equipment and systems shall be designed with redundancy in mind.
- 22.25.4 If the system is mission critical and used for research, it shall be able to operate independently from any other building systems. It shall be able to automatically resume operation during an interruption from any utilities to the building; e.g. power, water, steam, hot water, chilled water, etc.
- 22.25.5 Air-cooled equipment shall never be installed without proper ventilation. Refer to the manufacturer's installation requirements for needed ventilation.

22.26 Identification of Equipment and Valves

- 22.26.1 Tag valves with 1.5" diameter brass tag with depressed black-filled numbers ½" high. Fasten tag to valve with brass "S" hook or brass jack chain. Tags shall be style 250 BL as manufactured by *Seton Name Plate Co.* or approved equal. Valve tags shall begin with number one and be numbered consecutively.
- 22.26.2 Prepare valve directories showing valve number, location, type of service, equipment controlled and normal position of valve. Frame directories under 1/8" thick clear

SECTION 22 - MECHANICAL

plastic and mounted as directed by the PM. Separate directory shall be provided for each major mechanical room. Valves located at unit heaters, cabinet heaters, radiation and reheat coils and at other small terminal units where the purpose of the valve is obvious, are not required to be tagged.

- 22.26.3 All temperature control switches, gauges, starters, disconnect switches, panels and pilot lights shall be identified with a machine engraved plastic nameplate. Each of the following items shall be identified with a machine engraved plastic nameplate:
 - 22.26.3.1 AC units
 - 22.26.3.2 Chillers
 - 22.26.3.3 Boilers
 - 22.26.3.4 Outside air unit
 - 22.26.3.5 Ceiling fans
 - 22.26.3.6 In-line fans
 - 22.26.3.7 All air terminal boxes
 - 22.26.3.8 Air sensors
 - 22.26.3.9 Unit heaters
 - 22.26.3.10 Water heaters
 - 22.26.3.11 All other similar type equipment
- 22.26.4 Letter size on plates for equipment identification shall not be $< \frac{3}{4}$ " high. Letter size on plates for control panels and small items of equipment shall be $\frac{1}{4}$ " high. Labels shall be secured in place with screws. Labels shall align with each other and shall be square with lines of surface on which label is placed. $\frac{3}{4}$ " square ID tags shall be located on metal ceiling grids for equipment above ceilings. Do not provide exposed external labels for equipment located in finished space.
- 22.26.5 Roof fans, condensing units and pumps shall be labeled with stenciled letters 1.5" high and painted with a contrasting colored enamel paint.
- 22.26.6 Schedule of all labels indicating size, color and lettering shall be submitted for review.

22.27 Identification of Piping

- 22.27.1 Identify all piping installed under this section, except as noted below, by means of plastic pipe markers equal to "Opti-Code" as manufactured by *Seton Name Plate Co., Wilmington Plastics Co.* or approved equivalent stencil. Markers shall be color-coded and shall be lettered in accordance with ANSI specification A13.1. All markers shall be held in place with color-coded tape with flow direction arrows printed on it. Apply a minimum of three (3) complete wraps of tape at each end of pipe markers equal to *Seton Style #AR* or approved equivalent.
- 22.27.2 Color coded tape pipe markers with flow arrows shall be applied within 12" of each pipe hanger. Additional markers shall be applied as required to permit reasonable visual identification of each visible pipe line from access doors, shaft openings, removable ceiling panels and other inspection areas. Pipe markers (or stencil) with system name and color coded tape flow arrows shall be located near valves, at points where pipes penetrate walls, floors and ceilings, or at the point where piping enters and exits a vessel, tank or piece of equipment. Pipe markers shall be neatly arranged and applied squarely after pipelines are insulated and/or painted.

SECTION 22 - MECHANICAL

- 22.27.3 Pipe markers are not required on small equipment connections where identification is obvious.
- 22.27.4 Pipe markers shall be installed on exposed piping in finished public spaces.
- 22.27.5 Pipe markers are required in fan rooms, mechanical equipment rooms, inside RTUs and above all ceilings.
- 22.27.6 The contractor shall submit sample markers and a schedule of lettering and coloring to the architect and to Facilities Management for review.

22.28 Small-Packaged Boilers

- 22.28.1 *Harsco* P-k N 2000-2 boiler with a *Honeywell W7800* control, 2,000,000 BTUH input, 1,700,000 BTUH output. Boiler size may vary depending on location and heating loads, JMU has standardized our small packaged unit boilers in an effort to reduce spare parts inventory. The *Patterson Kelly Thermific* boiler with the *Honeywell W7800* controller is the current preference.
- 22.28.2 Contractor shall install an interlocked circulation pump for each boiler. Flow 140gpm, Head 18', 1.5 HP. Pumps shall be frame mounted.
- 22.28.3 Buffer Tank shall be 48" diameter, 500 gallon, ASME 150psig, horizontal tank and base.
- 22.28.4 Breeching shall be double walled Metal-Fab Corr/Gard CGDW AL29-4C or JMU approved equal.
- 22.28.5 Flue duct shall be single-wall Metal-Fab Corr/Gard CGSW AL29-4C or JMU approved equal.
- 22.28.6 Gas regulators shall be *Sensus* service regulator model 243.
- 22.28.7 Valves >3" shall be 125psi lug-type butterfly valves with ductile iron bodies and EPDM liners.
- 22.28.8 Valves <3" shall be threaded bronze union valves.
- 22.28.9 Thermometers shall be digital and solar-powered.
- 22.28.10 Pressure gauges shall be 4" spring-dial type, dry, 0-100psi.
- 22.28.11 Condensate drain piping on breeching shall be *Tygon*.
- 22.28.12 Pressure reducing stations shall have piping supports on each side of the reducing valve using pipe saddles (for full wrap insulation).
- 22.28.13 All pipe guards shall be fabricated by a supplier regularly engaged in the manufacture of these items and installed per manufacturer's installation instructions.
- 22.28.14 All relief valve discharges shall be piped to discharge to the floor, and shall incorporate the proper piping supports.
- 22.28.15 Anti-seize shall be used for flange bolts only.
- 22.28.16 All threaded fittings shall be assembled with suitable pipe joint compound.
- 22.28.17 Strainers shall be Y-type with stainless steel mesh or screen baskets for all screwed or flanged applications.
- 22.28.18 Air vents shall be used in any system controlled by modulating control valve.
- 22.28.19 All modulating boilers shall have a minimum of a 10:1 turn-down ratio.
- 22.28.20 All drains from boiler exhaust vent piping and boiler cabinet shall be piped to an appropriate drain, have a trap and be constructed of stainless steel tubing.

SECTION 22 - MECHANICAL

- 22.28.21** All boiler water discharge piping shall have a check valve installed to prevent reverse flow conditions.
- 22.28.22** All boilers shall be installed on appropriate stands or concrete curbing to prevent water damages from floods.
- 22.28.23** All pumps shall be installed with properly sized breakers and motor controllers located near the pump that meet NEC requirements.
- 22.28.24** All boilers shall have independent outside air intake for boiler combustion to prevent negative room pressures.
- 22.28.25** All boiler water supplies shall be fitted with back flow preventers.

END OF SECTION 22

(23) STEAM**23.1 General**

- 23.1.1** The contractor shall provide all material, equipment and steam system connections required to provide JMU with the safest steam system possible.
- 23.1.2** Steam is available to the campus year-round and provided at pressures of 100, 150 and 250psig. Campus steam heat shall be utilized whenever possible. The campus steam distribution system pressure varies depending on location. When the connection point is determined, the system shall need to be designed based on that supply pressure.
- 23.1.3** Condensate generated by the steam use on campus shall be returned to the Power Plant by gravity return system or a pump system.
- 23.1.4** All valves, fittings, pipe and flanges shall be designed to only carry pressures of 150 or 300 psig, depending on location and shall be clarified during design. Components with ratings of 125 and 250 psig rated are NOT ALLOWED at *any* location.
- 23.1.5** All steam piping shall be schedule 40 ASTM Type "A" 106 seamless black steel pipe.
- 23.1.6** All condensate piping shall be schedule 80 ASTM Type "A" seamless black steel pipe.
- 23.1.7** All condensate return systems shall use an open loop configuration. Condensate coolers are not permitted.
- 23.1.8** All steam and condensate pipe 2 ½" and larger shall be welded.
- 23.1.9** All steam and condensate piping 2" and smaller shall be threaded.
- 23.1.10** All traps to be installed with unions and isolation valves for ease of removal. Traps be installed with y-strainer, test tees and check valves. The components, from drip leg to condensate return, shall be located in the following order:
 - 23.1.10.1** 700PSI carbon steel isolation valve
 - 23.1.10.2** Y-strainer
 - 23.1.10.3** Union
 - 23.1.10.4** Trap
 - 23.1.10.5** Union
 - 23.1.10.6** Tee with 3/8" test port valve
 - 23.1.10.7** Check valve
 - 23.1.10.8** 800 PSI carbon steel isolation valve
 - 23.1.10.9** Piping to the trap shall be (schedule 40)
 - 23.1.10.10** Piping from the trap (schedule 80)
- 23.1.11** Steam traps have been standardized campus wide and Armstrong steam traps are the preferred manufacturer. If another equivalent manufacturer is selected, the contractor shall provide the university with 7 traps of the same model to be used as spares.
- 23.1.12** Pressure reducing stations shall have support piping on each side of the reducing valve using pipe saddles for full wrap insulation. Steam pressure reducing valves shall also be equipped with flanges or UNIFLEX couplings to allow for removal. Standard unions are not acceptable. Pressure reducing valves that require external sensing lines shall use stainless steel sensing lines. Each pressure reducing station shall also be equipped with mechanical gauges on the inlet and outlet sides.

- 23.1.13 All pipe guards shall be fabricated by a supplier regularly engaged in the manufacture of these items and installed per manufacturer's installation instructions.
- 23.1.14 Any piping penetrations through tunnel walls, lids or building foundations shall be sleeved and sealed with a mechanical seal. Seal shall be expandable and water tight. Seal shall be sealed on the exterior with water tight, non-shrink grout.
- 23.1.15 Air vent relief discharges shall be piped to discharge to the floor.
- 23.1.16 Anti-seize compound shall be used for flange bolts only.
- 23.1.17 Flange nuts and bolts shall be ASTM A193/A193M, grade "B7" plain bolts with ASTM A194/A194M grade "2H" plain nuts. Zinc plated or galvanized steel bolts and nuts are not permitted on *any* steam or condensate application.
- 23.1.18 Steam regulators shall accommodate minimum and maximum steam loads. Pressure reducing steam stations shall be configured for parallel operation with two separate pressure reducing valves. If pressure reduction is more than a 10:1 ratio, then the station shall be configured for two-stage reduction. All pressure reducing stations shall be equipped for remote monitoring by the use of pressure transmitters on the HP and LP legs of the PRV. They shall also be equipped with mechanical gauges. Spence pressure reducing valves are the preference.
- 23.1.19 Underground steam condensate lines shall be installed in accessible tunnels and vaults, or with a direct-buried, pre-insulated, non-asbestos piping system. Tunnels and vaults shall have pumps installed when surface water is a problem. Vaults shall also be sloped to allow water to run to sump hole.

23.2 Condensate Pumps

- 23.2.1 Shall be sized to accommodate the steam system. Install pump plumb and level. Each pump and receiver shall be an ASME 150 rated vessel. Receivers shall be vented to the atmosphere with two separate vents. Each pump shall have an isolation valve on the condensate inlet and outlet, a check valve on the condensate inlet and outlet and be individually drainable. Each pump/receiver shall have its own sight glass to determine level, and its own pressure gauge to determine discharge pressure.
- 23.2.2 Pressure powered pumps are the preferred pumping method using steam supply as the prime motive. The pressure powered pump shall be equipped with its own pressure regulator for the steam supply with a 100 mesh y-strainer and a cycle counter. Each pump shall have a removable and reusable insulation blanket.
- 23.2.3 Centrifugal pumps are optional depending on the location, but shall be sized appropriately and shall be rated for high temperature applications of up to 210°F.
- 23.2.4 Traps shall be sized and installed for proper application of drip legs, mechanical equipment and radiators. Inverted bucket traps shall be used on drip legs and F&T traps shall be used on process heaters, converters and heat exchangers.
- 23.2.5 Strainers shall be Y-type with stainless steel 100 mesh or screen. All Y-strainers shall be rolled 90° for steam line applications to prevent condensate collection. Strainers shall also be equipped with blow-down valves.
- 23.2.6 Air vents shall be used in any system controlled by a modulating control valve.
- 23.2.7 All steam pipes shall be insulated to a minimum value of R-8.

- 23.2.8 Insulation blankets shall be removable/reusable two piece insulation blankets to cover pressure-powered condensate pumps, pressure regulators, steam traps valves and expansion joint body.
- 23.2.9 Gauges shall be 4" dry gauge with ¼" MPT connection and shall range so normal operating pressure is at mid-scale. Gauge shall be supplied with an anti-siphon tube. Pigtail and an isolation valves and petcock type valves are not permitted.

23.3 Gaskets

- 23.3.1 Steam systems shall use Type 304 stainless steel spiral-wound gaskets with non-asbestos fillers and carbon steel outer rings.
- 23.3.2 Condensate systems shall use full-faced garlock or spiral-wound gaskets all for flanged applications.
- 23.3.3 Expansion joints shall *only* be slip or ball type. They shall be designed for (150/300psig) @ 500°F for steam or condensate service.
- 23.3.4 Instantaneous or semi-instantaneous water heaters shall be pre-piped with only necessary steam, water and condensate hookups. Instantaneous/semi-instantaneous water heaters shall operate on water differential using the feed-forward principle. All water heaters shall be equipped for remote monitoring.

23.4 Heating Water Converters

- 23.4.1 Tube and shell design shall use water in the tubes and steam in the jacket. Straight tube design is preferred, but the U-tube design is acceptable.
- 23.4.2 Heating water converters shall also have 1.5" NPT branch connections on the inlet and outlet side of the heating water loop to allow for inspection and cleaning of the converter. The converter shall also be equipped with local thermometers and pressure gauges on the water piping side of the converter.

23.5 Steam/Condensate Flow Meters

- 23.5.1 Steam meters shall be of the "vortex-shedding" type and shall have pressure or temperature compensation capabilities to adjust for pressure and/or temperature fluctuations. Each meter shall have a flow totalizer/computer to show current flow rate, as well as totalized flow rate. These devices shall be interconnected with the B.A.S. being used. The accuracy of the flow meter shall be within +/-1.0% of the actual flow rate. The flow rate shall be measured and displayed in lbs/hr and totalized in klbs.
- 23.5.2 Condensate flow meters shall be of the electromagnetic flow meter type. Each meter shall have a flow totalizer computer to show current flow rate and totalized flow rate. These devices shall be interconnected with the B.A.S. being used. The accuracy of the flow meter shall be within +/-1.0% of the actual flow rate. The flow rate shall be measured and displayed in lbs/hr and totalized in klbs.

23.6 Control Valves

- 23.6.1 Control valves that are used on steam applications shall be rated for high temperature applications and of the pneumatic type. The pneumatic tubing for the control valve

shall be copper or stainless steel. Plastic tubing is not allowed within 3' of the control valve.

- 23.6.2** All control valves shall have isolation valves both before and after the control valve, as well as a y-type strainer before the control valve. The control valve shall also have a globe type bypass valve.

23.7 Underground Piping

- 23.7.1** All underground piping systems shall be direct-buried, pre-insulated piping. The water tight integrity of these systems is critical and all possible measures shall be taken to ensure water tight integrity.

- 23.7.2** All test procedures shall be followed and witnessed by a JMU representative.

23.8 Humidification

- 23.8.1** Direct-injection humidifiers are not permitted.

- 23.8.2** In-Direct humidifiers (Steam Heat Exchanger Humidifiers) are permitted when the air quality requirements dictate. When using indirect injection humidifiers, the water shall be pre-treated to remove impurities. Water softeners shall be installed to pre-treat the water prior to flowing into the humidifier. Deionized, demineralized or reverse osmosis water systems are other approved options for water pre-treatment.

23.9 Safety Relief Valves

- 23.9.1** Safety relief valves shall be installed on pressure reducing stations and elsewhere as required by the current ASME Boiler and Pressure Vessel Code.

- 23.9.2** Install safety valve discharge piping, without valves, to be vented to the atmosphere. If interior pipe chase is used for routing of discharge, the chase shall be vented and the escape piping shall also be insulated. Do not insulate the safety relief valve. Tell-Tale drains or drain holes on the valve body shall be routed to the closest floor drain. The lifting test level shall be clear of any obstructions to allow for routine testing.

23.10 Isolation Valves For Steam & Condensate Systems

- 23.10.1** Gate valves are the *only* permitted isolation valves for steam and condensate systems.

- 23.10.2** Globe valves are the *only* permitted valves used for throttling applications; i.e. bypass.

END OF SECTION 23

(24) PLUMBING

24.1 General

- 24.1.1 All water mains shall be buried to a minimum depth of 36" below grade.
- 24.1.2 All piping shall be contained within interior partition walls. Freeze-proof wall hydrants with extended stems can be supplied from interior partitions perpendicular to exterior walls.
- 24.1.3 An as-built valve directory shall be installed in the mechanical room. All valves shall be individually numbered and tagged to correspond with valve directory.
- 24.1.4 Dielectric unions shall not be used. 6" long brass nipple shall be used when connecting piping of dissimilar metals.
- 24.1.5 Residence halls shall utilize steam generated or gas fired domestic water heaters.
- 24.1.6 Administrative and other buildings may utilize electric domestic water heaters.
- 24.1.7 All isolation valves shall be ¼ turn, full-open ball valves.
- 24.1.8 Use the same manufacturer within the building for all plumbing components.
- 24.1.9 Linked neoprene seals shall be used in all piping sleeves that penetrate walls or slabs.
- 24.1.10 Sump pumps and/or sewage lift stations shall not be used. Elevator sump pumps are acceptable.
- 24.1.11 Backflow preventers shall be of the reduced pressure zone (RPZ) type. The assembly shall include shut off valves on inlet and outlet, and strainer on inlet. Backflow preventers shall include test cocks and pressure-differential relief valve located between two (2) positive seating check valves.
- 24.1.12 Backflow preventers shall be mounted approximately 3'-4' above the floor and be readily accessible for maintenance.
- 24.1.13 Backflow preventers shall be located inside a heated building.

24.2 Water Service (Exterior)

- 24.2.1 Underground water supply services to new construction or additions shall be ductile iron pipe, type K copper or 200 psi black plastic tubing (PE or PEX) in special applications. Above ground water piping above ground shall be type L copper.
- 24.2.2 All buildings shall be supplied with a main water cutoff valve within 10' of an exterior wall of the building.
- 24.2.3 Static water pressure test at hydrants shall be performed by A/E or their designee.
- 24.2.4 Exterior wall hydrants are to be provided every 100' along walls and shall be equipped with automatic integral backflow preventers.
- 24.2.5 Wall hydrants shall be concealed, freeze-proof and automatic draining with a key lock.
- 24.2.6 Cut off valves shall be within 5' of every fire hydrant.
- 24.2.7 All valve boxes shall be raised to ground level.
- 24.2.8 All underground gravity storm and sanitary drains shall be PVC, except specifically designed acid-resistant waste drains.
- 24.2.9 All exterior drinking fountains shall be frost proof type.

24.3 Water Service (Interior)

- 24.3.1 Shut-off valves shall be located on each floor, on take offs from all vertical risers, branch lines from the main and at the connection to each fixture or piece of equipment.
- 24.3.2 Isolation valves to all bathroom units, kitchens and all equipment shall be IPS threaded.
- 24.3.3 Pressure reducing valves shall be provided in all buildings at the domestic water entrance downstream of the meter and provide a full size by-pass loop around the PRV and meter.
- 24.3.4 Pressure regulating valves shall be single seated, direct operated type, bronze body, integral strainer, complying with requirements of ASSE standard 1003. Provide inlet and outlet shutoff valves and by-pass valve. Provide pressure gauge on valve outlet.
- 24.3.5 Domestic water meters shall be installed in each building. Irrigation system shall be metered separately.
- 24.3.6 All bathrooms, mechanical equipment rooms, glycol tanks and cooling towers shall be equipped with a hose bib. Public bathrooms shall include a key-operated hose bib.
- 24.3.7 Provide lockable access doors for all isolation valves, hammer arrestors and trap seal primer valves serving the domestic water systems.
- 24.3.8 All backflow preventers shall be installed below adjacent permanently installed electrical equipment. Adequate provisions shall be made to catch leaks and provide direct discharge to the floor drain.
- 24.3.9 Faucets shall be solid brass construction with vandal proof aerator.
- 24.3.10 Water closets and urinals shall have a Sloan manual flushometers.
- 24.3.11 All automatic flushing sensors shall be hard-wired and include a manual override.
- 24.3.12 Lavatories, sinks and water coolers to have threaded 1.5" chrome plated cast p-traps with cleanouts and brass escutcheons.
- 24.3.13 All bathroom fixtures shall be caulked with 100% white silicone sealant.
- 24.3.14 All exposed piping in toilet rooms shall be chrome plated brass.
- 24.3.15 All plumbing penetrations in wall shall be caulked air tight with acoustical caulk.

24.4 D/W/V

- 24.4.1 Drainage piping shall be cast iron or PVC.
- 24.4.2 All urinals shall have sch40 PVC piping to the main drain.
- 24.4.3 Drains shall be provided in all sprinkler valve rooms, restrooms, cooling towers, mechanical rooms and any other area subject to either continuous or intermittent wetting.
- 24.4.4 All above ground gravity storm and sanitary drains shall be cast iron, except those serving grease-laden or harsh chemical waste.
- 24.4.5 Wall cleanouts in corridors are preferred to floor cleanouts where possible. Cleanouts shall be adjustable and equipped with an internal brass plug with counter sunk brass screws holding rim to body cover. Wall cleanouts shall be stainless steel round access covers.
- 24.4.6 All cleanouts at or above the ceiling shall be brought to the floor level of the fixture being served.

SECTION 24 - PLUMBING

24.4.7 Acid waste piping above ground shall be flame-retardant schedule 40 polypropylene with socket fusion fittings. Mechanical joints allowed only under lab benches inside accessible cabinets and not in cabinet pipe chase. Below ground piping shall be schedule 80 polypropylene with socket fusion fittings.

24.5 Valves & Fixtures

24.5.1 Waterless urinals shall not be permitted, except when directed by JMU.

24.5.2 Lavatory faucets shall only use 4" center faucets with single lever commercial heavy duty brass.

24.5.3 Sinks shall be counter mounted, self-rimming 18 gauge stainless steel with an 8" depth, not to interfere with ADA requirements.

24.5.4 Sink faucets shall be 8" single lever commercial heavy duty brass.

24.5.5 Sink and lavatory faucets shall be Delta brand.

24.5.6 Electric water coolers shall be electric push button or push bar and all stainless steel exterior, including skirt.

24.5.7 Provide chilled bottle filling stations at all water coolers.

24.5.8 All shower valves shall be Symmons brand.

24.5.9 Shower Valves shall include the following items:

24.5.9.1 Single lever operated pressure balance anti-scald valve with integral stops and tamper proof water saver shower head

24.5.9.2 Valve body and internal components are all brass, bronze and stainless steel, and lever handle, chrome plated bronze with stainless steel set screw

24.5.9.3 Heavy-duty ½" diameter control spindle

24.5.9.4 Compression-type shut-off

24.5.9.5 Positive shut-off of at both hot and cold entering water to eliminate free possibility of by-pass of hot to cold

24.5.9.6 Handle movement shall provide 360° rotation.

24.5.9.7 Positive accurate pressure balancing control with stainless steel precision around piston.

24.5.10 Shower heads shall be heavy duty, solid brass and chrome-plated with no removable parts.

24.5.11 Off-site fabricated shower basins shall be of solid polymer construction. Shower stall walls shall be finished with ¼" solid surface polymer panels. Panels shall extend at least 2" below top of threshold of shower basin on all walls in shower stall. Panel and base material shall be from the same manufacturer.

24.5.12 Installation of shower basin connections to drains through slab shall be properly aligned and water tight.

24.5.13 Shower valves and shower heads shall be installed on a sidewall in the shower unit so that the spray from the shower head does not spray toward the threshold or shower curtain.

END OF SECTION 24

(25) ELECTRICAL

25.1 General

- 25.1.1 The campus' primary electrical system is 23 K.V. and owned by the Harrisonburg Electrical Commission (HEC). Secondary services to buildings and facilities shall be 480/277V or 208/120V. Both systems shall be 3-phase, 4-wire WYE connected. All buildings shall be provided with a shunt trip main circuit breaker. Key activated switch shall open main circuit breaker (MCB) to be located adjacent to fire alarm annunciator. Key switch shall be Locknetics H.D. brand key switch #643-05.
- 25.1.2 HEC shall provide and install transformers and make primary and secondary connections. The contractor shall provide transformer pad and HEC shall provide pad specifications and inspections. For further information contact the HEC via Mr. Zach Nyce; P.E., (540) 434-4361.
- 25.1.3 All damages incurred to new or existing electrical installations shall be immediately reported to the PM and repaired by the contractor at no additional cost to JMU.
- 25.1.4 The A/E or contractor shall provide two (2) copies of all operating manuals, diagnostic tools, software and sufficient training for all electrical systems and their components; e.g. generators, FAC system, lighting controls, etc.
- 25.1.5 A/E shall verify current NEC at design phase.
- 25.1.6 The main electrical room shall have direct exterior and interior access and be separate from any mechanical room.
- 25.1.7 Ceilings are not allowed in Mechanical/Electrical/Telecom rooms.
- 25.1.8 Use only standard type toggle switches to operate the lights in all electrical, mechanical and telecommunication rooms. The use of motion type sensors is not acceptable.
- 25.1.9 An Arc Flash Study shall be required and all electrical panels shall be labeled per NFPA 70e.
- 25.1.10 It is the responsibility of the Architect/Engineer to design an electrical distribution system that can be selectively coordinated.
- 25.1.11 All separate variable speed drives and combination starters shall be provided by the mechanical contractor.

25.2 Inspections

- 25.2.1 All electrical work shall be inspected and approved by the JMU electrical inspector. Inspections shall be scheduled by the contractor and additional inspections shall occur at the discretion of JMU.
- 25.2.2 Job-site construction drawings shall show actual conduit runs. They shall be marked and maintained on a daily basis throughout the entire project.
- 25.2.3 Upon project completion "as-built" drawings shall be submitted showing the actual finished locations of all electrical systems and any modifications to the original approved drawings.

25.3 Service

- 25.3.1 All breakers shall be a minimum of 20A rated.

SECTION 25 - ELECTRICAL

- 25.3.2 Every electrical panel board shall be rated at 225-amp minimum. The MCB and all conductors shall be sized to full panel board capacity. Sizing of conductors and MCB's shall not be based on load calculation only. Each panel board shall have its own 225A circuit from the Main Switchgear or MDP. Main lug or "Pass-Through" lug panels are not allowed.
- 25.3.3 Electrical panels shall have 40% spare capacity. Supply a minimum of eight (8) ¾" empty conduits from recessed panels to an accessible location for future use.
- 25.3.4 No panel boards shall be located in housekeeping closets. Provide electrical closets on each floor dedicated to electrical panels only.
- 25.3.5 Kitchens shall have dedicated electric panelboard(s) serving only kitchen-related outlets. Feeding kitchen-related circuits from other electrical panelboards is unacceptable. Kitchen related panelboards shall have a minimum of (8) spare ¾" conduits and two (2) 1" conduits stubbed into acceptable ceiling space for future kitchen-related circuits.
- 25.3.6 All interior transformers shall be floor mounted.
- 25.3.7 Integrated transformer/panel boards shall not be used.
- 25.3.8 Switchboards, panelboards and components shall have copper buss bars.
- 25.3.9 Main switchboards shall contain a 10-function electronic digital monitoring system. This monitor shall have capabilities to reset approximate values, KWH in particular.
- 25.3.10 When panel boards are used as main service equipment, the same meter shall be installed adjacent to it and provisions for current transformers and other connections shall be made.
- 25.3.11 Provide written documentation of all parameters for digital electrical meters provided in the switchgear.
- 25.3.12 Fusible switches shall be spring-loaded types, with interlock and padlock capabilities.
- 25.3.13 Provide spare fuses for fusible switches. Fuses shall be stored in the main electrical room.
- 25.3.14 All switchgears shall have bake-lite nameplates.
- 25.3.15 Panel boards for light and power shall be of the dead-front, automatic C/B type. Circuit breakers shall be bolt-on or I-line type. Panel boards shall have copper grounding bars. Covers shall be sided hinged.
- 25.3.16 When an electrical panel is surface mounted, all under slab conduit that turns up into the electrical panel, shall transition from sch40 PVC to a rigid 90° elbow before extending through the floor. IMC conduit shall extend from the 90° elbow into the bottom of the panel.

25.4 Branch

- 25.4.1 Single device boxes shall be a (4"x4"x2.125") minimum size with appropriate plastering or adapter. Junction and pull boxes shall be a minimum of (4"x4"x2.125") with appropriate cover.
- 25.4.2 Provide at least two (2) separate electrical 20A, 120V receptacle circuits in every residence hall room.
- 25.4.3 Provide (2) GFCI receptacles outside of each building entrance. Each receptacle shall be on its own dedicated 20A, 120 volt circuit.

SECTION 25 - ELECTRICAL

- 25.4.4 All receptacle covers shall be labeled with the circuit and panel designation with an adhesive type label.
- 25.4.5 Wiring devices shall be hard-use, specification-grade, 125V AC, 20A, back or side wired. Devices to have clamp type terminals. Switches to be rated 277 VAC regardless of system voltage.
- 25.4.6 Receptacles shall be provided at each entrance foyer and at least every fifty feet 50' in all hallways. These receptacles shall be on a dedicated circuit.
- 25.4.7 Provide at least one dedicated 20A, 120V receptacle circuit per bathroom.
- 25.4.8 Each mechanical room shall have (1) 3 phase, 50A, 250V welder receptacle.
- 25.4.9 Provide at least one 20A, 120 VAC GFCI receptacle in each electrical, elevator, mechanical, maintenance storage and trash room, and at each cooling tower and AHU, and on exterior of the building at the front and the rear. Each circuit shall be dedicated to its respective room.
- 25.4.10 Receptacles serving vending machines shall have their own 20A dedicated circuit to each receptacle. There shall be one (1) communications outlet for each bank of machines.
- 25.4.11 Pre-wired lighting systems shall not be used.
- 25.4.12 All conductors in boxes serving receptacles shall be pigtailed so that the device can be removed without interrupting the circuit.
- 25.4.13 Junction boxes shall not be located any closer than 4' to any steam piping.
- 25.4.14 All device covers shall be approved by the JMU PM.

25.5 Wiring

- 25.5.1 Minimum conductor size for power wiring to be #12 AWG.
- 25.5.2 All wire shall be insulated for 600V with stranded copper conductors with THWN or THHN insulation as applicable.
- 25.5.3 Use spring-type connectors for #10 AWG and below. Use solderless connectors and splices in #8 AWG and above.
- 25.5.4 Grounding shall use exothermic welds where appropriate.
- 25.5.5 Conductor color-coding for 208/120V:
 - 25.5.5.1 A-Black
 - 25.5.5.2 B-Red
 - 25.5.5.3 C-Blue
 - 25.5.5.4 N-White
- 25.5.6 Conductor color coding for 480/277V
 - 25.5.6.1 A-Brown
 - 25.5.6.2 B-Orange
 - 25.5.6.3 C-Yellow
 - 25.5.6.4 N-Grey

25.6 Exterior

- 25.6.1 Provide a 60A, 3 phase, 208/120V NEMA3R, non-fused, lockable disconnect switch on the exterior of the building. Verify the switch location with the JMU PM.

SECTION 25 - ELECTRICAL

- 25.6.2 Provide metal-backed warning locator tape at half the distance between underground conduit and the proposed finished grade. Locator tape shall be a minimum of 12" above the conduit.

25.7 Conduit

- 25.7.1 All underground wiring shall be installed in sch40 PVC conduit, minimum 1.25" diameter.
- 25.7.2 Where two (2) or more conduits are placed in the same ditch, they shall always be placed on elevated base spacers and fully encased in concrete. Intermediate spacers shall be sized to the conduit and provided for all stacked conduits.
- 25.7.3 All above-grade conduit size shall be at least ¾". Pre-wired flexible conduit, other than fixture whips, shall not be used. Fixture whips shall be no more than 6' in length.
- 25.7.4 No conduit fittings are to be used in concealed areas.
- 25.7.5 Compression-type connectors or couplings shall not be used for interior applications. "Die Cast" connectors of any type are prohibited.
- 25.7.6 Home run conduits from distribution panels shall be installed directly to the first device. No more than three (3) 90° bends between junction boxes shall be acceptable.
- 25.7.7 Install pull string in all empty telecom conduits.
- 25.7.8 All telecom conduits shall have a junction box after two 90° bends.

25.8 Life Safety

- 25.8.1 All Life Safety electrical panels are required to have a minimum breaker size of 60A.
- 25.8.2 All panels shall have conductors and MCB sized to full panelboard capacity. Sizing of conductors and MCB's shall *not* be based on load calculation only.

25.9 Generators

- 25.9.1 Emergency power shall be supplied by generator set and transfer switch.
- 25.9.2 Transfer switches and related components shall be compatible with selected generator-set manufacturer. Acceptable manufacturers are Caterpillar, Onan, Kohler, Katolite and Generac. Proprietary equipment is not acceptable. The ATS control pad shall provide the following display features:
 - 25.9.2.1 Utility voltage by phase
 - 25.9.2.2 Emergency voltage by phase
 - 25.9.2.3 Frequency by phase
- 25.9.3 The generator set shall be located outside of the building in a discreet location.
- 25.9.4 Generators shall be natural gas fueled whenever practicable. If a diesel generator is used, it shall be fueled by #2 diesel and be equipped with a skid mounted fuel tank. The tank shall be located in an accessible location to permit refueling.
- 25.9.5 JMU may require additional emergency power beyond the typical code requirements.
- 25.9.6 Diesel generators shall meet all current Environmental Protection Agency (EPA) Standards of performance for Stationary Compression Ignition Internal Combustion engines and shall include the following features:
 - 25.9.6.1 NEMA 3R housing for outdoor installation with lockable access doors

SECTION 25 - ELECTRICAL

- 25.9.6.2 Engine mounted solid-state start-up/stop system
- 25.9.6.3 Automatic load transfer (do not include exercise time clock)
- 25.9.6.4 Key operated run/stop switch located in transfer switch
- 25.9.6.5 Coolant temperature gauge
- 25.9.6.6 Exciter field circuit breaker
- 25.9.6.7 DC voltmeter
- 25.9.6.8 Running time meter
- 25.9.6.9 Lamp test switch
- 25.9.6.10 Oil pressure gauge
- 25.9.6.11 Fault reset switch
- 25.9.6.12 Low oil pressure shut down
- 25.9.6.13 Low fuel shut down
- 25.9.6.14 120v engine block heater
- 25.9.6.15 Dual range AC ammeter and volt meter
- 25.9.6.16 Phase selector switch
- 25.9.6.17 Frequency meter
- 25.9.6.18 Rheostat for voltage adjustment
- 25.9.6.19 Critical grade muffler with rain cap
- 25.9.6.20 Main line circuit breaker
- 25.9.6.21 Battery charger (equalizer float type)
- 25.9.6.22 Over speed and over crank shutdown
- 25.9.6.23 Batteries
- 25.9.6.24 Securely mounting to a permanent foundation
- 25.9.6.25 Generator set shall not serve multiple buildings.
- 25.9.7 Contractor to supply initial full tank of fuel. Contractor to supply documentation from a fuel analysis that is performed prior to start-up. This analysis should test the following parameters:
 - 25.9.7.1 Cetane Index
 - 25.9.7.2 Water
 - 25.9.7.3 Water and Sediment
 - 25.9.7.4 ISO Cleanliness
 - 25.9.7.5 API Gravity
 - 25.9.7.6 Distillation
 - 25.9.7.7 Micro-organisms(both bacteria & fungus)
- 25.9.8 Generators <100kw shall provide a means of connecting a portable load bank. The method of connecting the portable load bank shall be easily accessible.
- 25.9.9 Generators >100kw shall be supplied with an external load bank, either mounted on the generator or permanently mounted within 10' of the generator. This load bank shall be sized as to provide no less than 80% and no more than 100% of the generator's maximum capacity. The load bank shall also have the ability to manually adjust the load. The load bank shall also have the ability to be turned off when not in use.
- 25.9.10 Generator shall be able to communicate warnings and critical alarms to the BAS. Locate generator annunciator panel near building fire alarm control panel.

SECTION 25 - ELECTRICAL

- 25.9.11 Provide at least one empty ¾" conduit and pull string between the generator enclosure and the ATS switch.
- 25.9.12 Contractor shall supply a laptop capable of operating the required software. Contractor shall also supply all necessary supplemental cables and connectors to use with the connections to the generator, ATS and laptop.
- 25.9.13 Generator shall be provided with at least one (1) double-duplex convenience outlet. This outlet shall be mounted in an accessible location within the generator enclosure. This outlet shall be fed from a minimum 20 amp capacity breaker that is clearly marked and is also on emergency power.

25.10 General Lighting

- 25.10.1 The university attracts a varying array of age levels from toddlers to the elderly for the multitude of activities and learning offered. It is our responsibility to design a safe environment for all individuals without sacrificing the natural environment. The designer shall use *Dark Skies* friendly fixtures when possible with a minimum CRI of 80.
- 25.10.2 The designer shall use these guidelines as a minimum value to achieve, and be able to demonstrate good to excellent facial recognition at a distance of 30 feet.
- 25.10.3 Sidewalk or area lighting shall match existing campus lighting. Design exterior systems based on performance criteria of existing university fixtures. JMU shall provide wiring system design to be used.
- 25.10.4 Design consultant shall submit shop drawings for the approval of all proposed lighting fixtures prior to submitting final bid documents.
- 25.10.5 Fluorescent fixtures shall be by Lithonia, Hubbell, Metalux or Daybrite. Lenses for troffer type fixtures to be .125" acrylic, parabolic or refraction types depending on application.
- 25.10.6 Number of different styles of fixtures shall not exceed 20 per building, including all exit and egress fixtures.
- 25.10.7 All emergency lights shall be connected to 277V circuits. Battery backed-up ballasts are not acceptable.
- 25.10.8 Dimming of fluorescent lighting systems is prohibited.
- 25.10.9 All classrooms shall be equipped with internally illuminated exit signs.
- 25.10.10 Provide generator transfer devices to meet egress lighting requirements in the event of a power failure.
- 25.10.11 All stairway lighting shall be no higher than 10' above finished floor height and shall be accessible from a 6' ladder.
- 25.10.12 Exterior lighting, including building mounted units, shall be controlled by a lighting contactor controlled by a photoelectric eye. A hand-off auto switch shall be installed in the cover of contactor enclosure. Time clocks are not acceptable (don't even ask).
- 25.10.13 All multimedia rooms, classrooms and offices shall be provided with a multiple level controlled lighting.
- 25.10.14 Office lighting to be controlled by a ceiling mounted sensor with wall mounted toggle switch override suitable for bi-level switching.

SECTION 25 - ELECTRICAL

25.11 Interior Lighting Fixtures

- 25.11.1 Fluorescent fixtures in new buildings shall utilize T5 lamps.
- 25.11.2 All LED lighting shall carry at least a 5 year full product replacement warranty.
- 25.11.3 All usage of LED lighting shall be approved by JMU prior to being included in the construction documents.
- 25.11.4 Color temperature shall be between 2500°K to 4100°K.
- 25.11.5 Color temperature shall not vary more than 200°K within a connected space.
- 25.11.6 Recessed "can" type fixture shall only be used in locations with hard ceilings that allow repair access through lamp opening only. The use of these fixtures shall be kept to a minimum regardless of location. The exception is recessed fixtures with a minimum aperture of 7".

25.12 Exterior Lighting (LED Only, all measurements taken at ground level)

25.12.1 *Parking Garages & other Covered Parking Areas*

- 25.12.1.1 Parking Facilities, Garages and covered parking spaces:
- 25.12.1.2 Average Horizontal Illuminance = 6FC,
- 25.12.1.3 Average Vertical Illuminance shall produce a uniformity ratio of 25% of the horizontal Illuminance value.
- 25.12.1.4 These values shall be uniformly distributed throughout the parking facility inclusive of stairs, ramps and elevators.
- 25.12.1.5 Parking Entrances shall conform to the most current IESNA standard.

25.12.2 *Parking Lots (Uncovered)*

- 25.12.2.1 Average Horizontal Illuminance = 3FC
- 25.12.2.2 Average Vertical Illuminance shall produce a uniformity ratio of 25% of the horizontal Illuminance value.
- 25.12.2.3 These values shall be uniformly distributed throughout the parking lot inclusive of likely loitering areas.

25.12.3 *Pedestrian Ways (Including walkways and bike paths)*

- 25.12.3.1 Underpasses: Day – Maintained Horizontal Illuminance = 10FC, Maintained Vertical Illuminance = 5FC
- 25.12.3.2 Underpasses: Night – Maintained Horizontal Illuminance = 5FC, Maintained Vertical Illuminance = 3FC
- 25.12.3.3 Dense Foliage Areas: Night – Maintained Horizontal Illuminance = 5FC, Maintained Vertical Illuminance = 3FC
- 25.12.3.4 Open Area Sidewalks and Footpaths: Night Average Horizontal Illuminance = 3FC, Vertical Illuminance values shall produce a uniformity ratio of 25% of the horizontal Illuminance value, lighting shall extend on both sides of path to a distance of 30 feet. Measurements taken at 36" above surface.
- 25.12.3.5 Dormitory Commons Areas: Night – Average Horizontal Illuminance values shall produce a uniformity ratio of 23% of the horizontal Illuminance value.

25.13 Classroom

- 25.13.1 In all classroom and mediated meeting rooms provide a projector mounting panel. EPSON PC3 ELPMBFCP, false ceiling plate, 14' to 18' from screen. Provide a 1.5" EMT

SECTION 25 - ELECTRICAL

conduit from panel to deep 4 11/16" junction near or at the podium location. Provide a 20A, 120V dedicated circuit to panel using knock-out provided in panel.

- 25.13.2 At podium location, provide control conduit as noted in section (25.7). Additionally, provide a 20A 120V outlet and one (1) telecommunications outlet at podium location.
- 25.13.3 Provide box and ¾" conduit for projection screen control at teaching podium location.
- 25.13.4 Do not use motion detection to control lighting in lab settings.
- 25.13.5 No daylight harvesting is allowed in any lab setting or instructional space.

25.14 Fire Alarms

- 25.14.1 The fire alarm panel shall communicate on the existing 4120 Simplex network.
- 25.14.2 Fire alarm system to be addressable with voice evacuation, fully supervised and include battery backup. Voice evacuation component shall include public address system capabilities.
- 25.14.3 All devices, connections, wire, etc. shall be supplied by the contractor to furnish a fully operating system, whether or not called for by items in plans or specifications.
- 25.14.4 Provide 6 (each) spare smoke detectors, heat detectors, audio visual devices and pull stations to JMU upon acceptance of fire alarm system.
- 25.14.5 All fire alarm wiring shall be in EMT conduit painted red, with junction covers painted red also.
- 25.14.6 Extension of existing systems may require addressable devices and programming at the FAC panel. Power supplies may need to be increased in some cases. Notification appliance power supplies need to be easily accessible from the FAC panel.
- 25.14.7 Systems shall contain no propriety components that could disallow JMU, or our legally appointed contractor, from performing maintenance or modifications.
- 25.14.8 Provide a complete programming point list of FAC panel, including MAPNET address and device text.
- 25.14.9 No serviceable components shall be installed above ceilings or other concealed areas.
- 25.14.10 All FAC cabinets, battery storage cabinets and other miscellaneous cabinets shall be factory provided with CAM locks keyed to Corbin CAT 15.

END OF SECTION 25

SECTION 26 - CONVEYING SYSTEMS

(26) CONVEYING SYSTEMS

- 26.1** For telecommunication requirements in elevators see section (27.7).
- 26.2** All new elevators shall be “vandal-proof” and ADA compliant.
- 26.3** Cars shall be equipped with a hands-free telephone, exhaust fan, emergency lighting, protection pad hooks and one set of protection pads.
- 26.4** Independent testing and inspection of the elevator installation and performance shall be included in the construction contract.
- 26.5** Elevator keys shall be provided to the project manager.
- 26.6** Elevators shall be stretcher-capable in multiple story buildings.
- 26.7** Elevator systems shall contain no proprietary equipment, software or diagnostics.
- 26.8** Elevator contractor shall provide at least two (2) sets of schematics, drawings and diagnostic tools. Complete copies of all diagnostic software shall be provided to JMU upon substantial completion. Software shall be provided on a tablet computer or self-contained device. If it is self-contained device, it shall be compatible with ALL elevators on campus of that brand.
- 26.9** Elevator pits for hydraulic elevators shall have sump pits with oil separators.
- 26.10** Sump pump shall contain an oil-sensing cutout and control system capable of pumping water, while containing oil. The system shall function automatically and shall provide for an alarm to the BAS and separate LED lights in the event of any of the following:
 - 26.10.1** Presence of oil in the sump
 - 26.10.2** High amps or a locked motor condition
 - 26.10.3** High liquid in the sump
- 26.11** Control panel shall include Led lights for power and pump run function.
- 26.12** All machinery and equipment shall be designed and installed to be accessible by maintenance personnel.

END OF SECTION 26

SECTION 27 - TELECOMMUNICATIONS

(27) TELECOMMUNICATIONS

27.1 General

- 27.1.1 All telecommunications cables, jacks and components of emergency phone systems, with the exception of power, shall be furnished by JMU.
- 27.1.2 All conduits shall contain bushings and 210lbs tensile strength pull strings.
- 27.1.3 No conduit shall have individual bends that exceed 90°.

27.2 Building Telecommunications Entrance

- 27.2.1 Building entry shall consist of a minimum of (6) 4" sch40 PVC conduits from the building Main Distribution Frame (MDF) into the utility tunnel or manhole specified by JMU Telecommunications Department (JMU TD). Manhole and conduit placement shall be coordinated with the Assistant Director of the JMU TD to determine the best location to connect with our existing infrastructure and network.
- 27.2.2 Conduits shall enter MDF within 4" of a corner.
- 27.2.3 Conduits shall be installed so that water cannot enter the building by means of the conduits.

27.3 Main Distribution Frame (MDF) & Intermediate Distribution Frame (IDF)

- 27.3.1 The MDF is a space that serves as the central point for inter-floor and inter-building connections. The MDF shall be at least 12'x14' and the IDF shall be at least 8'x14', and both shall have a minimum clear ceiling height of 10'. If other trades have equipment within the MDF/IDF, the room size shall be increased accordingly.
- 27.3.2 The MDF and IDFs shall be vertically aligned between floors when possible.
- 27.3.3 There shall be one MDF per building located on the lowest floor practicable.
- 27.3.4 There shall be at least one (1) IDF per floor, unless building size permits otherwise.
- 27.3.5 The MDF may also function as IDF for the floor in which it resides.
- 27.3.6 Finished ceilings and carpets are not allowed.
- 27.3.7 Fire rated ¾" plywood backer board shall be installed. The backer board shall be painted white in color, the stamp of the fire rated plywood needs to be taped prior to being painted and facing in so it can be inspected by the Fire Marshall. The plywood shall be installed on all walls from 2' above finished floor to 10' above finished floor.
- 27.3.8 Lighting for these rooms shall be a minimum of 30 foot-candles vertically.
- 27.3.9 The MDF/IDF shall not be located more than 250' of actual conduit from any work area outlet. If the building is too large to meet the requirement, one or more IDF rooms shall be used to ensure that no conduit run exceeds 250' from either MDF or IDF.
- 27.3.10 The temperature and humidity shall be controlled in accordance with the manufacturers' specifications for the equipment anticipated to be housed in the MDF. In general, temperature should be maintained between 50°F and 80°F and maintain a relative humidity of less than 55%. If the building has a generator installed, it shall be on generator backup.
- 27.3.11 The climate control for the MDF/IDF shall be independent from any other space.
- 27.3.12 No water, drain or condensing lines or pipes shall run through MDF/IDF.
- 27.3.13 No trades shall use any conduits dedicated to telecommunications at any time.

SECTION 27 - TELECOMMUNICATIONS

- 27.3.14 Entry to the MDF/IDF shall be from a public corridor. Entry through any other space shall only be approved by the JMU TD Assistant Director.
- 27.3.15 Entry to MDF/IDF shall have a lockable door that swings out.
- 27.3.16 Lights shall be protected fixtures switched without occupancy sensors.
- 27.3.17 In addition to power requirements for programmed space use, there shall be a duplex work outlet receptacle in an accessible location.
- 27.3.18 MDF/IDF rooms shall be served by a minimum of three (3) 20A circuits, two (2) of which are located within the equipment racks. One receptacle outlet shall be located in an accessible area of the wall. Exact locations shall be specified by the JMU TD.
- 27.3.19 When available, all circuits shall be on generator backup.
- 27.3.20 In some buildings, major voice and data equipment beyond the norm and may need to be installed in the MDF. In such special cases, additional power shall be supplied in accordance with the specifications of the equipment manufacturer.
- 27.3.21 JMU PM shall ensure that the A/E verifies and documents all planned equipment during the preliminary drawing phase.
- 27.3.22 Four (4) 4" conduits shall connect the MDF to the first IDF and each IDF to the IDF above itself.
- 27.3.23 MDF/IDF needs to be situated so that three of the four walls do not restrict the installation of conduit(s).

27.4 Work Areas

- 27.4.1 Each room of 100ft² or less is to be considered a work area.
- 27.4.2 For rooms that exceed 100ft², a work area is to be considered every 100ft², or portion thereof, within the room.

27.5 Outlet Boxes

- 27.5.1 Minimum of two (2) 4"x4" flush mount outlet boxes shall be installed in each work area.
- 27.5.2 Outlets shall be installed on opposing walls from each other.
- 27.5.3 Outlet locations shall be verified and approved by the JMU TD at the preliminary plan phase. The JMU PM shall coordinate and confirm this process.
- 27.5.4 Each work area outlet shall have a single gang plaster ring installed to accommodate the installation of a standard single gang faceplate.
- 27.5.5 Outlet boxes shall also be installed as required for alarm, card readers, wireless access points, emergency phones, elevators and other special use circuits.

27.6 Horizontal Distribution System

- 27.6.1 Each work area outlet shall be directly connected by a 1" conduit to the IDF or MDF located on the same floor. Exposed conduit is not desired and its use shall be approved by the JMU PM.
- 27.6.2 All conduits shall stub-out no further than 6" into the MDF or IDF.
- 27.6.3 All conduits shall be labeled with work space numbers.

SECTION 27 - TELECOMMUNICATIONS

- 27.6.4 All horizontal conduits shall enter the MDF/IDF from an adjacent above-ceiling space, and at no point below 90" A.F.F. If conduits must enter through the MDF/IDF floor, it shall be pre-approved by the JMU TD and conduits may not exceed two (2) rows deep.
- 27.6.5 Rooms may not have service fed from two different IDFs or MDFs.
- 27.6.6 All junction boxes shall be installed in an accessible location even after project is complete. Junction boxes shall be covered and placed above ceiling in a public corridor.
- 27.6.7 Other conduits for special circuits, sound, security, card readers, or fire alarms that must enter the MDF or IDF, shall be grouped separately from the work area outlet conduits.
- 27.6.8 All above-grade telecommunications pathways shall be 1" EMT conduit with solid steel connectors.
- 27.6.9 Communications floor box conduits shall run to the nearest wall with ceiling access and then to an above-ceiling junction box or pull-box, before connecting to the nearest MDF/IDF.

27.7 Elevators

- 27.7.1 Equipment installed within the elevator cart shall be compatible with the telephone service provided by the JMU TD and shall be programmable to dial a 5-digit extension directly to the JMU Police dispatcher.
- 27.7.2 "Outside call center" service shall not be acceptable.
- 27.7.3 Emergency Communications System: System shall provide two-way voice communication without using a handset and provide visible signals that indicate when system has been activated and when dispatcher has responded. Upon activation, system dials a pre-programmed number to JMU's Police dispatcher and identifies elevator location to dispatcher through Telecommunications phone switch. When elevator phone is called from dispatcher no additional keypad entry has to be entered by dispatcher other than the original five digits for phone to have two-way communications. Phone shall also disconnect when dispatcher ends call or "hangs up" with no additional keypad entry by dispatcher. System is contained in flush-mounted cabinet with identification, instructions for use and battery backup power supply.
- 27.7.4 Emergency Landing Intercoms (ELI) shall use emergency phone equipment provided by the JMU TD for the required two-way communication. These devices shall be recessed and the size of the box shall be considered in furring out the wall.

27.8 Grounding

- 27.8.1 A grounding bar shall be installed in the MDF and each IDF. The grounding bars shall be electrically connected to each other and to the main building ground at the building electrical service entrance.

27.9 Emergency Phones

- 27.9.1 Gai-Tronics brand equipment is the only brand used at JMU.

SECTION 27 - TELECOMMUNICATIONS

- 27.9.2 The height of telecommunications outlets for emergency phones shall be specified by the JMU TD.
- 27.9.3 Any exterior or parking garage emergency phones shall contain a blue light.
- 27.9.4 Every stairwell shall have a surface mounted emergency phone installed on the landing of every floor.
- 27.9.5 Electrical power is only required for blue light emergency phones.
- 27.9.6 Any "pole" style emergency phone shall require the use of a template that will be supplied by the JMU TD.

27.10 Junction Boxes

- 27.10.1 Junction boxes shall be a minimum 4"x4".
- 27.10.2 Junction boxes shall be installed as a pull point every two (2) 90° bends in the horizontal cabling conduits. Conduits shall be in-line or in a "straight-thru" manner.
- 27.10.3 Junction boxes shall be located within a public corridor.
- 27.10.4 If more than two (2) conduits are within the same area they shall be located in a larger pull box.
- 27.10.5 Larger pull boxes shall not exceed 24"x24".

27.11 Roof Penetrations

- 27.11.1 A roof penetration shall be required for future use. There shall be a 2" conduit run from roof penetration to the upper most IDF with a weather head installed.

27.12 Wireless Access Points (WAP)

- 27.12.1 WAP shall be determined by the JMU Information Technology department in conjunction with the JMU TD.
- 27.12.2 All WAPs shall have a 4 11/16" x 4 11/16" junction box with an extension ring in order to maintain the infrastructure bend radius.
- 27.12.3 All WAP boxes shall have conduits installed in accordance with outlet boxes and conduit specifications previously stated.
- 27.12.4 WAPs installed in "drop-ceilings" shall outlet boxes shall be mounted not more than 12" above finished ceiling and include a single-gang plaster ring.
- 27.12.5 WAPs installed in a drywall or "hard" ceiling shall have flush-mounted outlet boxes with a double-gang plaster ring.

27.13 Classrooms

- 27.13.1 Classrooms that contain a projector shall require a telecommunications outlet above ceiling.
- 27.13.2 Communications outlets shall be piped back to the nearest MDF/IDF.
- 27.13.3 Any podium location shall require more than the normal amount of connections. The telecommunications outlet for this shall have a 1.25" conduit with a 4 11/16" x 4 11/16" outlet box with a double-gang plaster ring.

SECTION 27 - TELECOMMUNICATIONS

27.14 Manhole Specifications

- 27.14.1 Contractor shall prepare area, furnish and install a load bearing pre-cast concrete manhole of 6'x8'x7'h.
- 27.14.2 The manhole shall be placed on a 12" gravel base and contain a French drain or approved drainage system within the manhole.
- 27.14.3 Contractor shall ensure that all joints are properly sealed to prevent entrance of water.
- 27.14.4 Contractor shall ensure conduit penetrations into manhole be adequately sealed to prevent entrance of water.
- 27.14.5 Point of conduit entry into manhole shall be as close to a corner location as possible.
- 27.14.6 The manhole shall have a 3' diameter removable cover labeled in a way that indicates the manhole is for communications. The manhole cover shall be load bearing and suitable to withstand traffic.
- 27.14.7 Contractor shall furnish and install access ladder, racking on all four sides and pulling eyes within the manhole.
- 27.14.8 The manhole shall be installed so the cover is flush with existing grade.

27.15 Buried Conduit Specifications

- 27.15.1 Contractor shall furnish and install 4" schedule 40 PVC.
- 27.15.2 Contractor shall ensure conduits are separated by spacers intended for the purpose.
- 27.15.3 Contractor shall install conduits on a bed of sand or fine rock dust and encase conduits in a 3" envelope of slurry or concrete with a magnetic tape installed 12" above the concrete.
- 27.15.4 Contractor shall ensure backfill material shall be free of rock.
- 27.15.5 Conduits shall be installed so the top of the concrete is minimally 24" below finished grade.
- 27.15.6 Conduit runs shall not exceed 500' between pulling points. The sum of all bends between pulling points shall not exceed 180° degrees and no single bend shall be more severe than a sweep 90°.
- 27.15.7 Conduit penetrations into manholes or buildings shall be adequately sealed to prevent the entrance of water.
- 27.15.8 The end of conduits shall be capped unless otherwise specified.
- 27.15.9 Conduit runs between manholes shall consist of six (6) 4" conduits unless otherwise specified.
- 27.15.10 Conduit runs between a manhole and a building shall consist of six (6) 4" conduits unless otherwise specified.
- 27.15.11 After installation of buried conduits all disturbed areas shall be returned to their pre-installation condition.
- 27.15.12 Contractor shall bore underground areas where applicable.
- 27.15.13 The contractor shall be responsible for conforming to all applicable Erosion and Sediment Control Regulations.
- 27.15.14 The contractor shall coordinate all work with JMU TD Project Manager.

SECTION 27 - TELECOMMUNICATIONS

27.16 Completion Documents

- 27.16.1 Contractor shall provide the project manager with as as-built, marked up copy of all drawings once the project is completed.
- 27.16.2 When the work on the entire project has been completed and is ready for final review, a visit shall be made by the JMU PM. At that time, all requirements of the contract shall be demonstrated to be fully completed and that the installation has been adjusted and operated in accordance therewith.
- 27.16.3 The contractor shall provide JMU a written guarantee or warranty for the entire work of this contract against defective materials, workmanship and performance for a period of at least one year from the date of acceptance of the installation. The contractor hereby agrees to furnish, without cost to JMU or the Commonwealth of Virginia, all transportation, both ways, for replacement of all parts and materials which are found to be defective during the guarantee period. The standard warranty of the manufacturer shall be deemed acceptable, provided it meets or exceeds these requirements.

END OF SECTION 27

(28) FINISHES

28.1 Ceilings

- 28.1.1 All new suspended grid acoustical ceiling shall be a 2'x2' pattern. Ceiling tiles shall be Armstrong 756A.
- 28.1.2 Renovations and/or additions shall match existing tiles.
- 28.1.3 Acoustical suspended grid system shall be white and of the highest quality available.

28.2 Walls

- 28.2.1 High impact type Gypsum board is preferred in areas requiring moderate security.
- 28.2.2 Finish of gypsum wallboard system shall meet or exceed industry standards ASTM C-840 level 5 finish.

28.3 Floors

- 28.3.1 All floor tiles shall be a minimum of one-eighth (1/8") thick.
- 28.3.2 All floor tiles shall be twelve inches by 12"X12" square.
- 28.3.3 All resilient floor tiles shall be reinforced vinyl.
- 28.3.4 Provide sealed concrete tile floors in as custodial closets.
- 28.3.5 The standard resilient base is a heavy-duty vinyl or rubber cove base with a minimum thickness of 0.125" and a minimum height of 4".
- 28.3.6 Outside corners shall be specified as pre-molded.

28.4 Paint

- 28.4.1 Paints shall be top quality acrylic or enamel. Contractor grade paint shall not be used. Preferred brands are Sherwin Williams or Duron.
- 28.4.2 Provide semi-gloss paints to bedrooms, bathrooms, mechanical rooms, housekeeping closets, telecommunication rooms and maintenance storage rooms.
- 28.4.3 All surfaces shall be pre-primed based on substrate. Use red oxide on galvanized surfaces.
- 28.4.4 New construction doors and frames shall factory powder-coated.
- 28.4.5 Field painted door frames shall use oil based primers (if there is no factory primer coating) and final coat to be gloss enamel.
- 28.4.6 Gypsum walls to be primed with latex primers. Walls shall have two (2) applications of top quality acrylic paints.
- 28.4.7 At the conclusion of the project, the contractor shall provide to JMU with the supplier name, color, brand, mix formula and location of each type.
- 28.4.8 All wood doors to be finished natural, using two (2) coats of top quality lacquer. Gemini coatings clear pre-coat lacquer or approved equivalents shall be used.
- 28.4.9 Paint shall be used at full thickness and shall only be thinned for required spraying applications. Spraying shall be pre-approved by JMU PM and shall always be back-rolled.

END OF SECTION 28

SECTION 29 - WOOD & PLASTIC

(29) WOOD & PLASTIC

- 29.1 Preservative treated (PT) lumber shall not be used in finished walls.
- 29.2 Stainless steel fasteners and hardware shall be provided in conjunction with PT woodwork.
- 29.3 All finish carpentry shall match adjacent surfaces in existing building or a defined transition shall be installed.
- 29.4 Modular sizes shall be used throughout campus.
- 29.5 Exposed finished cabinetry surfaces shall be plastic laminate or hardwood veneers.
- 29.6 Use concealed-face frame Euro-style hinges on all cabinetry.
- 29.7 All cabinetry shall use Euro-spaced modular shelf pin systems. Spare shelf pins shall be provided upon job completion.
- 29.8 Use stainless steel pulls on all cabinet doors and drawers.
- 29.9 All casework to be AWI premium grade. Particle board shall not be used in any applications.

END OF SECTION 29

SECTION 30 - INTERIOR FURNISHINGS

(30) INTERIOR FURNISHINGS

30.1 Furnishings

30.1.1 Furnishings shall be selected and purchased by JMU.

30.1.2 A/E shall coordinate space requirements and design for all selected furnishings.

30.2 Window Coverings

30.2.1 Window coverings shall be designed to reduce cooling demand for the building.

30.2.2 All window coverings shall be included in the construction drawings.

30.2.3 Window covering standards for color and style shall be determined in the preliminary phase of the project and maintained throughout the building.

30.2.4 Minimum standard shall be 1" aluminum, commercial-grade blinds.

END OF SECTION 30

SECTION 31 - SIGNAGE

(31) SIGNAGE

- 31.1 All building signage shall be plastic laminate.
- 31.2 All signage shall be attached to walls with adhesive or approved sign holders. Signage shall not be attached to doors.
- 31.3 All signage for ceiling-enclosed sprinkler valves, fire dampers, alarms, transformers, primary isolation valves, etc. shall be clearly specified and attached to the ceiling.
- 31.4 Signage identifying room areas and functions shall be provided by JMU.

END OF SECTION 31

*****END OF JMU DESIGN & CONSTRUCTION GUIDELINES*****

VARIANCE FORM

THIS FORM WILL BE MADE AVAILABLE THROUGH YOUR PROJECT MANAGER UPON REQUEST.