

Alabama A&M  
University



Wireless as a Service (WaaS)  
Request for Proposal (RFP)  
P002-2K20

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## **Organizational Overview**

Alabama Agricultural and Mechanical University (AAMU) is a historic, student-friendly and community-focused institution of higher learning. Reflecting on its heritage as a historical black college and university (HBCU) and a traditional 1890 land-grant institution, AAMU functions as a teaching, research and public service institution, including extension. Founded in 1875 by a former slave, Dr. William Hooper Councill, AAMU is a dynamic and progressive institution with a strong commitment to academic excellence. The serene, intimate campus is situated on “The Hill,” only a short distance from downtown Huntsville, the site of the school’s founding.

Alabama Agricultural and Mechanical University provides more than 60 undergraduate, graduate and certificate programs and concentrations, a diverse international faculty, 50 plus student organizations, and an extensive alumni network comprised of politicians, educators, entrepreneurs, doctors, lawyers, engineers, scientists, authors, artist, and more, many of whom are change agents on the local, national and international stage.

The university’s academic curriculum is organized into four colleges:

- College of Agricultural, Life and Natural Sciences (**CALNS**);
- College of Engineering, Technology and Physical Sciences (**CETPS**);
- College of Education, Humanities and Behavioral Sciences (**CEHBS**); and
- College of Business and Public Affairs (**COBPA**).

Alabama Agricultural and Mechanical University is pleased to be nationally-recognized and our most successful graduates are proud to cite AAMU as a major factor in preparing them for their achievements in life and in the workplace.

### **Our Mission**

Alabama Agricultural and Mechanical University is a public, comprehensive 1890 Land-Grant institution, committed to access and opportunity, and dedicated to intellectual inquiry. The application of knowledge and excellence in teaching, research and service is responsive to the needs of a diverse student population and the social and economic needs of the state and region. The University offers contemporary baccalaureate, master’s, educational specialist and doctoral level degrees to prepare students for careers in the arts, sciences, business, engineering, education, agriculture and technology. As a center of excellence, the University is dedicated to providing a student-centered educational environment for the emergence of scholars, scientists, leaders and critical thinkers, who are equipped to excel through their contributions and leadership in a 21st century national and global society.

### **Our Vision**

The vision of Alabama Agricultural and Mechanical University is to be recognized as the premier Land-Grant institution of choice for students, faculty, staff, and future employers of its students. The University will be recognized nationally and internationally for excellence in teaching, research, outreach, exceptional academic programs and globally competitive students.

## **Our Core Values**

- **STUDENT CENTERED:** The University strives to promote the intellectual, physical, social, and emotional development of students in all facets of University life.
- **EXCELLENCE:** The University is committed to excellence in all aspects of operations.
- **INTEGRITY:** The University maintains the highest standards of ethical professional practices in all that we do.
- **ENGAGEMENT:** The University extends its reach and impact through providerships and collaboration with individuals, public and nonprofit agencies, community activist groups, educators, and businesses.
- **CUSTOMER SERVICE:** The University provides respectful, polite, and consistently excellent service to our internal and external constituents.
- **GLOBAL:** The University prepares globally aware and astute students for the 21st century.
- **DIVERSITY:** The University respects and embraces diversity and actively supports efforts that create an inclusive learning environment.
- **ACCOUNTABILITY:** The University is a responsible steward of the public's resources and public trust.

## **Our Strategic Priorities**

- Enhance AAMU's Distinctiveness and Competitiveness
- Strengthen Structures, Operations, and Systems to Promote and Support Organizational Excellence and Stewardship
- Upgrade University Infrastructure and Facilities
- Secure the University's Financial Future
- Enhance the University's Image and Recognition
- Enhance University Engagement through Expanded Outreach

## **Important Dates**

- RFP Release Date: July 1, 2020
- Pre-Proposal Meeting: July 15, 2020
- Deadline for Submitting Questions: July 29, 2020
- Responses to Questions Submitted: As Released
- Deadline for Submitting Proposals: 16:00 CST August 14, 2020
- Oral Proposal Presentations: Aug 22 – Sept. 3, 2020
- Bid Award: September 4, 2020

## **Project Summary**

Alabama A&M University Information Technology Services department (AAUM-ITS) is seeking a provider to provide a “White Glove” fully managed “Wireless as a Service” (WaaS) offering. This wireless service must improve the overall wireless coverage across the campus to facilitate student learning, research capabilities, collaboration, and security. This WaaS offering must compliment our current Residential Network (AAMU-ResNET) by providing seamless connectivity and transition from the AAMU-ResNET areas into the Academic, Administrative and Support areas of the campus with Wireless networking coverage. This WaaS offering must also be capable of integration with our overall security goals of micro-segmentation in a zero-trust access model in our efforts to achieve and maintain the highest possible governance and compliance standards in a higher education setting. Additionally, in response to the COVID-19 pandemic, the wireless service must also include the necessary hardware required to provide Real Time Location Services (RTLS) with an accuracy of 3 meters or less. This solution should also include the following services:

- Network Synthesis
  - ↳ Structured cabling remediation (as required)
  - ↳ Procurement, licensing, deployment, management and support of WiFi network
  - ↳ Capacity required to support 1000x1000Mbps to each endpoint device,
  - ↳ 802.11ax (WiFi 6) w/ BLE, CBRS, or 5G capable devices
  - ↳ Mobile App API integration for location services
  - ↳ Contact Tracing technology
  - ↳ Provide secured outdoor WiFi coverage of a large remote research “farm”
- Network Realization
  - ↳ Integration with a Single Sign On
  - ↳ Integration with Network Access Control / Software Defined Networking
  - ↳ User portal facilitating the registration/management of devices

↘ Social Media / Email Account registration of guest users

- Must support dynamic packet capture capabilities for negative endpoint impacting events and must be stored for at least 7 days without the need for additional services or appliances
- Ability to keep location data and proximity data for 90 days
- Must provide continuous monitoring which can proactively alert IT of detected problems
- Detailed analytic data that can provide specific identification of RFI introduced into area
- 8x5x52 phone support, 24x7x365 Online support
- University Special Event / Promotions Support
  - ↘ SOAR – Student Orientation and Registration
  - ↘ Student Move-in week(s)
  - ↘ High School Senior Day
  - ↘ Sports events
  - ↘ Other events coordinated with University Marketing and Student Activities

## **Current Solution**

The current state of the network is best described as “in transition”. We have just completed the installation of a new buried OS2 fiber plant connecting each building on campus to two separate data center locations on campus. We have also, in the last 5 years, developed and implemented a Structured Cabling Standard that sets the minimum cabling requirements to 10G rated Cat6a copper in each building that is being renovated or any new construction being performed.

The wireless systems that are currently in place have been deployed in various stages as leadership, budgets, and technology have advanced over the years. Budgets traditionally have not allowed for the salary requirements of a qualified wireless networking engineer to perform Radio Frequency (RF) spectrum surveys and plan a deployment that would provide consistent coverage in all areas needing WiFi. As a result, we have wireless technology in place ranging from Foundry IronPoint 200, Aruba AP105, Aerohive AP250, to Ruckus AP730. The most common deployment strategy has been to place the Wireless Access Points (WAPs) along hallways which leaves gaps in coverage due to the age, construction materials, and other RF interference that was not considered.

We have provided a breakdown of the number of WAPs that are currently in place, with an approximate number per building in the chart below.

- IronPoint – 50 active
- Aruba – 251 active
- Aerohive – 284 active
- Ruckus – 26 active



<b>Building Name</b>	<b>Foundry</b>	<b>Aruba</b>	<b>Aerohive</b>	<b>Ruckus</b>
Crump Agricultural Mechanics Building	10			
Bibb Graves Hall	2			
School of Business	8	26	2	
Carnegie Library	2			
Aramark Receiving Warehouse				
Carter Science Hall			7	
Carver Complex	8	21	14	5
Councill Credit Union		1	1	
V. Murray Chambers Science Building	4	8	2	
Councill Training Center (Athletics / ROTC)	2	10		
W. H. Councill Hall		4	1	
Louis Crews Stadium			6	1
Dawson Extension Building	2	6		
Drake Hall	1			
Drake Memorial Learning Resource Center	3	16	5	
T. M. Elmore Gym		1	7	
A. J. Bond Hall (School of Engineering)			23	
Agricultural Research Center Building		18		1
Foster Irradiation Center	5			
Foster Living Learning Complex			69	
Frank Lewis Gym				
New Residence Hall			64	
Green Houses				
<b>Honors Center Building</b>				
Hopkins Residence Hall		14		
Hester House			1	
Eugene Kendrick Maintenance Facility			1	
Ralph Lee University Center			4	
McCalep Vocational Building			6	
<b>McCormick Building</b>				
Mechanical Engineering Annex (Quonset Hut)				
Morris Residence Hall		12		
Morrison Fine Arts Building	3	18	2	
Palmer Residence Hall		11		
T.R. Parker Annex (New Classroom Building)		15		
Patton Hall Administration Building			4	
Poultry Science Building			2	
INSERVICE Writing Center / Dora's House				
University Services Building		1	1	
Human Resources			1	
Stephens Residence Hall		13		
Terry Residence Hall		12		
Thigpen Residence Hall				19
Knight Living Learning Complex		44	58	
<b>State Black Archives (Wilson)</b>				
Hobson Field House			1	
Normal Hills Student Apartments				
Health & Wellness Center			2	
W.T. Research Station (Remote Site)				
<b>Totals</b>	<b>50</b>	<b>251</b>	<b>284</b>	<b>26</b>

## **Statement of Need**

The AAMU ITS department is seeking a provider to design, deploy, manage and maintain a seamless wireless infrastructure, that complements our AAMU-ResNET service, that will be provided to all faculty, staff, and students in academic, administrative and support areas of the campus.

In response to the COVID-19 pandemic and the growing concerns of parents over school related emergencies, it is becoming increasingly necessary to have the hardware and systems in place to accurately locate users and devices across the campus as a part of our life safety planning. This area of technology is constantly growing and evolving into newer and better technologies that are capable of providing location information with accuracy of less than 1 meter. It is the desire of the University to incorporate these technologies and systems to help bolster the security and well-being of all of our students, faculty and staff.

This solution will require the Offeror to come on campus and perform wireless RF spectrum surveys within each location listed below to properly plan the placement of Wireless Access Points (WAPs) based on RF propagation and coverage, install the needed hardware, cabling and materials, in accordance with the AAMU Structured Cabling Standard, to provide the necessary bandwidth and capacity to each WAP to support a minimum of 100Mbps to each connected device, provide the hardware, Licensing, and support for each installed device as part of the managed service, provide an “on-boarding / registration” portal to positively associate an end user with a specific device, provide a minimum of 30 days history of user / device proximity data, provide technical support for end users who are experiencing trouble with wireless connectivity, provide reporting and analytic data to the ITS Administration to demonstrate a positive Return on Investment (ROI).

Additionally, we are seeking to provide Wireless coverage at our **Winifred Thomas Agricultural Research Station**. This location is designed to provide facilities and outdoor laboratories to completely integrate the instructional, research, extension, and public service programs at **Alabama A&M University**, under the traditional land-grant concept. The 972 acres facility in **Hazel Green** is used by research faculty and graduate students for diverse agricultural research studies in Agronomy, Animal Science, Horticulture, Forestry, Soil Science and other Environmental topics. The facility is also used for numerous outreach activities for and by the community including workshops by Alabama Cooperative Extension Service (ACES), ROTC, field days, school field trips, 4H, FFA and more.

## **Scope of Work**

In order to adequately provide the services requested in this RFP, the Offerer must be capable and willing to meet the full scope of work as laid out below:

- AAMU shall provide, to the best of it's ability, building architectural drawings, schematics, or renderings for each of the locations listed. In the event that such information is not currently available, accurate, or otherwise beneficial, it shall be the responsibility of the Offeror to generate the necessary information needed to properly design, plan, and implement the requested solution.
- Offeror shall provide heat maps along with Topological Design plans to install the necessary structured cabling, materials, and hardware needed to the AAMU ITS dept. for review and approval by both the AAMU ITS and Facilities Departments.
- Offeror shall provide detailed documentation of Network Synthesis specifications to AAMU ITS Network Infrastructure Dept. in order to facilitate collaboration and integration of design into the existing IT Infrastructure with minimal disruption to existing services and systems.
- Offeror shall be responsible for sub-contracting any portion of the necessary labor and construction activities out to an approved Offeror for Network Realization.
- Offeror shall be responsible for the acquisition, licensing, installation, maintenance, and timely upgrades of 802.11ax (WiFi-6) WAPs, beacons, sensors, and other hardware required for RTLS
- Offeror shall have the ability to house and secure location and proximity data for a minimum of 30 days, not to exceed 365 days
- Offeror shall be responsible for providing adequate coverage in all areas of the listed locations to support capacity and bandwidth exceeding 100x100Mbps to each connected endpoint device
- Offeror shall provide device on-boarding / registration via our Single Sign-on Solution (SSO), eduroam network, or by way of Google, Facebook, LinkedIn, etc. to positively associate and end user to a specific device.

- Offeror shall provide a secure solution to connecting IOT / POS devices to our secured network for the purposes of governance and compliance regulations (e.g. FERPA, HIPAA, PCI-DSS, CMMC).
- Offeror shall provide documentation and demonstrate compliance with all data governance and compliance regulations concerning the capture, transmission, storage, access, and release of sensitive data.
- Offeror shall support dynamic packet capture capabilities for negative endpoint impacting events and must be stored for at least 7 days without the need for additional services or appliances
- Offeror shall provide continuous performance monitoring which can identify potential issues and proactively alert IT of detected problems.
- Offeror shall maintain detailed analytics that can provide specific cause/effect analysis of specific user identified events that negatively impact end-user satisfaction
- Offeror shall provide, at minimum, 8x5x52 phone support, 24x7x365 Online support
- Offeror shall be responsible for conducting ongoing customer service surveys in an effort to identify potential areas for growth, improvement, or service offerings
- Offeror shall provide Special Event / Promotions support as requested by the AAMU Administration and Marketing teams.

## Due Diligence

While the AAMU ITS Dept. may be capable of assisting in some data gathering requirements to provide a solid workable solution, it is the Offeror's sole responsibility to perform the necessary Due Diligence up to and including:

- Obtaining / generating appropriate building schematic drawings that include construction material types and layout that can affect adequate wireless coverage in all areas on campus **EXCLUDING** the locations in **Appendix C: AAMU Network Segments** section 2. “AAMU-ResNET”
- Obtaining / generating wireless surveys to determine Wireless Access Point placement.
- Obtaining / generating wireless surveys to determine areas where RF interference may need to be addressed.
- Obtaining / generating quotes to provide structured cabling / power requirements for any installed hardware.
- Ensuring that any additional structured cabling installed meets or exceeds the AAMU ITS requirements as set forth in **Appendix D: AAMU Structured Cabling Standard**

## Project Specifications

The AAMU ITS Dept. seeks to drastically improve our WiFi offering to meet the needs of the University in a world that is more connected than ever before. The dependence on mobility has increased exponentially over the last decade, and with the average number of wireless devices jumping from an average of 1.5 devices per user to 5 or more, keeping up with this demand has become impractical given our staff and budgets.

- Proposed solution must provide simplified device "on-boarding" solution that registers the device being on-boarded to a specific user or function.
- Proposed solution must support integration with our campus SSO solution.
- Proposed solution must support integration with the [eduroam](#) international research and education wireless network authentication platform.
- Proposed solution must support guest network authentication via social media or email account registration (e.g. Gmail, Facebook, LinkedIn).
- Proposed solution must meet or exceed IEEE 802.11ax standards
- Proposed solution must support integration with a Network Access Control solution.
- Proposed solution must provide RTLS technology capable of user tracking and proximity data gathering with an accuracy level of less than 3 meters.
- Proposed solution must be capable of storing packet capture metadata for detailed troubleshooting and analysis for up to 7 days.
- Proposed solution must be capable of storing device tracking and proximity data for 30 days minimum, not to exceed 365 days.
- Proposed solution must be capable of integration with available COVID-19 Contact Tracing platforms currently available on the market.
- Proposed solution must support integration with IPv6

## **Regulatory Compliance**

Offeror must be able to provide documentation demonstrating compliance with, or immunity from, all regulations that are relevant to this market. Moreover, Offeror should have a plan in place to ensure that they stay up to date on any relevant regulatory changes. Specific regulations potentially affecting the organization include the following:

- **CCPA** – California Consumer Privacy Act
- **CIPA/COPPA** – Children's Internet Protection Act / Children's Online Privacy Protection Act
- **CMMC** - Cybersecurity Maturity Model Certification
- **EUGDPR** – European Union General Data Protection Regulation
- **FERPA** - Family Educational Rights and Privacy Act
- **GDPR** - General Data Protection Regulation
- **GLBA** - Gramm-Leach-Bliley Act
- **HIPAA** - Health Insurance Portability and Accountability Act
- **IDEA** - Individuals with Disabilities Education Act
- **NIST** - National Institute of Standards and Technology Cybersecurity Framework
- **NSLA** - National Summer Learning Association
- **PCI-DSS** - Payment Card Industry Data Security Standard
- **PPRA** – Protection of Pupil Rights Amendment

## **Technical Support**

In the event of an unscheduled outage, or other major issue, AAMU-ITS dept. will expect to be able to receive assistance from the Offeror via phone anytime, 24x7x365. We understand that most problems that would rise to this level will likely be beyond either of our control, but in the event a technician needs to be dispatched to resolve an issue caused by the Offeror, the Offeror's equipment, or the Offeror's system, we expect the issue to be resolved in no more than 4 hours.

All maintenance that may result in an outage needs to be coordinated with AAMU-ITS dept. no less than 2 weeks in advance so that we can properly schedule and communicate the maintenance window with AAMU Faculty, Staff, and Students to ensure loss of service does not interrupt other important school related services (e.g. testing, finals, etc.)

- Offeror must be headquartered, or have a physical presence, within a 4 hour driving radius of 4900 Meridian Street North Huntsville, AL. 35811.
- Offeror shall provide all users with an online ticketed support system that is available 24x7x365 with an SLA of less than 2 hours.
- Offeror must provide a telephone support center that is available 8x5x52 with an SLA of less than 1 hour.



## **Mandatory Pre-Proposal Meeting**

1. A pre-proposal meeting **with a subsequent site walk-thru** will be held at the Patton Hall Administration Building, 4210 Morrison Circle NE Huntsville, AL. 35811 Suite# 317 Conference Room from 1:00 till 2:00 p.m. CST on July 15, 2020. The purpose of this pre-proposal meeting is to review the RFP process and proposal requirements. We will answer questions regarding the requirements and execution of the RFP during this meeting. **NOTE: Clarifying responses provided verbally at the pre-proposal meeting shall not be considered official. If an addendum is deemed necessary, one will be released and made available to all parties present.** One representative from each participating Offeror must be present at the pre-proposal meeting in order to be deemed responsive to participate in this Request for Proposal.
2. Attendance at the pre-proposal meeting is mandatory. Proposals will only be accepted from those Offerors who are represented at the meeting. Attendance will be evidenced by each representative's signature on the attendance roster.
3. Any explanation desired by any Offeror regarding the meaning or interpretation of this RFP, Scope of Work, Technical Specifications, and other solicitation documents must be submitted to Jeffrey Robinson, Director of Purchasing, via Offeror Registry no later than the Deadline for Submitting Questions reflected on the Important Dates section of this RFP. Offeror Registry can be accessed via this link <https://vrapp.Offerorregistry.com/Bids/View/BidsList?buyerId=55df4993-1fea-423e-a2af-7d0075907669> where Offerors should ask all clarifying questions. This method allows for open disclosure of questions and answers for all Offerors to reference at any time throughout the bidding process.
4. Questions and answers will be posted on the Purchasing website through Offeror Registry. Oral responses provided by the University at the pre-proposal meeting shall not be considered official until posted on the website.
5. It shall be the obligation of the Offeror to exercise due diligence to discover and to bring to the attention of the University, at the earliest possible time, any ambiguities, discrepancies, inconsistencies, or conflicts in or between any of the technical, pricing, or contractual provisions in this RFP.
6. University facilities are open for scheduled inspection by Offerors and the Offeror retains sole responsibility in ensuring the proper assessment of these facilities and the resources required to perform satisfactorily within this environment.

# **Proposal Requirements**

## **1. PROPOSAL REQUIREMENTS**

Each Offeror is expected to submit a fully detailed proposal that adequately describes the advantages and benefits, which the University would realize by acceptance of its proposal. The response to this RFP shall consist of the following tabbed sections:

- Letter of Transmittal
- Executive Summary
- Corporate Background and Experience
- Project Staffing and Organization
- Technical Approach
- Cost Proposal and Execution of Proposal
- Financial Reports
- Offeror's Standard Form of Agreement, if applicable
- Additional Information and Attachments, as required
- References

**A) Letter of Transmittal:** The letter of transmittal shall consist of the proposal cover letter highlighting the contents of this proposal, and bearing the authorized representative's signature. It should include an introduction of the Offeror's company, the name, address, telephone number, email address, and fax number of the person to be contacted along with others who are authorized to represent the company in dealing with this RFP.

**B) Executive Summary:** An executive summary will briefly describe the Offeror's approach and clearly indicate any options, alternatives, or enhancements being proposed. It should also indicate any major requirements that cannot be met by the Offeror. Alabama A&M University will assume full compliance with all specifications herein if no exception is taken. Any award made by the University hereunder shall bind the Offeror to the terms, conditions, and specifications set forth in this Request for Proposal. Offerors whose proposals do not conform to said terms, conditions, and specifications should so note in their response to this section. No exemptions will be considered to have been taken by a Offeror unless it is properly set out as provided above.

**C) Corporate Background and Experience.** This section shall include background information on the organization and should give details of experience with similar projects. A list of three references (including contact persons and telephone numbers) for whom similar work has been performed shall be included.

- D) Project Staffing and Organization.** This section must include the proposed staffing, deployment, and organization of personnel to be assigned to this project. The Offeror shall provide information as to the qualifications and experience of all executive, managerial, legal, and professional personnel to be directly assigned to this project, citing experience with similar projects, credentials, and the responsibilities to be assigned to each person.
- E) Technical Approach:** This section shall include, in narrative, outline, and/or graphic form the Offeror's approach to accomplishing the tasks outlined in the Project Specifications. The Offeror must demonstrate their ability to meet all specifications as outlined in the Project Specifications.
- F) Cost Proposal and Execution of Proposal:** The Cost Proposal must be submitted on the "COST PROPOSAL SHEET" with all required information provided. Complete the "EXECUTION OF PROPOSAL," which must be signed by the Offeror's Representative.
- G) Financial Reports:** Furnish a current audited financial report for the company's most recent fiscal year.
- H) Offeror's Standard Form of Agreement:** If the University will be required to sign the Offeror's standard form of agreement, it **MUST** be submitted with your proposal for review by University Legal Counsel. Proposals that are contingent upon the University's acceptance of the Offeror's terms and conditions may be at a competitive disadvantage in the evaluation process. Further, if the University cannot accept the Offeror's terms and conditions, the University may reject such proposals as non-responsive.
- I) Additional Information and attachments, if any.**
- J) References.** Offerors shall provide a list of five (5) references of clients of same or similar type services. The reference list shall include current clients whose services have been provided within the past three years and at least one contact person and telephone number per reference. At least two of these references should be institutions of higher education. The University reserves the right to contact clients for reference checks.
- K) Cost Proposal** A Cost Proposal must be submitted for each implementation phase proposed.

**L) Execution of Proposal**

**By submitting this proposal, the potential Offeror certifies the following:**

- This proposal is signed by an authorized representative of the firm.
- The cost and availability of all equipment, materials, and supplies associated with performing the services described herein have been determined and included in the proposed costs.
- The potential Offeror has read and understands the conditions set forth in this RFP, and agrees to them with no exceptions. Therefore in compliance with this Request for Proposals, and subject to all conditions herein, the undersigned offers and agrees, if this proposal is accepted within 30 days from the date of the bid opening, to furnish the subject services.

OFFEROR: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CITY, STATE ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_

FEIN: \_\_\_\_\_

REPRESENTATIVE: \_\_\_\_\_

TITLE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_ DATE: \_\_\_\_\_

## 2) GENERAL INFORMATION ON SUBMITTING PROPOSALS

- A) **Exemptions:** Any exception taken to ANY portion of this Request for Proposals must be so stated on the proposal response sheets or Alabama A&M University will assume full compliance with all requirements as stated. The successful Offeror will be responsible and accountable for providing those terms as specified in its proposal response.
- B) **Competitive Offer:** The signer of any proposal submitted in response to this RFP certifies that his proposal has not been arrived at conclusively or otherwise in violation of either Federal or Alabama antitrust laws.
- C) **Reference to Other Data:** Only information which is received in response to this RFP will be evaluated.
- D) **Elaborate Proposals:** Elaborate proposals in the form of brochures or other presentations beyond that necessary to present a complete and effective proposal are not desired.

- E) Costs for Proposal Preparation:** Any costs incurred by Offeror in preparing or submitting proposals are the Offerors sole responsibility. Alabama A&M University will not reimburse any costs incurred in the submission of this proposal.
- F) Time for Acceptance:** Each proposal shall state that it is a firm offer which may be accepted within a period of 30 days. Although the contract is expected to be awarded prior to that time, the 30 day period is requested to allow for unforeseen delays.
- G) Right to Submitted Materials:** All responses, inquiries, or correspondence relating to or in reference to the RFP and other reports, charts, displays, schedules, exhibits, and other documentation submitted by the Offeror shall become the property of the University when received.
- H) Offeror's Representative:** Each Offeror shall submit with its proposal the name, address, and telephone number of the person(s) with authority to bind the firm and answer questions or provide clarification concerning the firm's proposal.
- I) Subcontracting:** Awarded Offeror is authorized to subcontract a portion of the work under the provisions of Section 3.K below.
- J) Clarification of Terms:** If a Offeror has questions about the specifications or other solicitation documents, the Offeror should contact the Director of Purchasing. Any revisions to the solicitation will be made only by addendum issued by the University.
- K) Withdrawal of Proposal Prior to Closing Date:** The Offeror may request withdrawal of its proposal under the following circumstances:
- 1) Proposals may be withdrawn by written notice from the Offeror to the University's Director of Purchasing, prior to the RFP closing date and time. The withdrawal shall be made by the person signing the proposal or by an individual(s) who is authorized by the Offeror. The Offeror must provide written evidence of the individual's authority to withdraw the proposal if the individual withdrawing the proposal is other than the person signing the proposal. Proposals may be withdrawn no later than two (2) business days prior to the closing date.
  - 2) Requests for withdrawal of proposals after opening of such proposal but prior to award shall be transmitted to the University's Director of Purchasing, in writing, accompanied by full documentation supporting the request. If the request is based on a claim of error, documentation must show the basis of the error.
  - 3) Proposals may be withdrawn for good cause after the closing date and prior to award. No Offeror who is permitted to withdraw a proposal shall, for compensation, supply

any material or labor to or perform any subcontract or other work agreement for the person or firm to whom the Contract is awarded or otherwise benefit, directly or indirectly, from the performance of the project for which the withdrawn proposal was submitted.

**L) Late Proposals:** Proposals received after the proposal closing date and time shall not be considered.

**M) Withdrawal of Proposals after Proposal Opening:** A Offeror may withdraw his proposal from consideration if the cost proposal was substantially lower than the other proposals due solely to a mistake therein, provided the proposal was submitted in good faith, and the mistake was a clerical mistake as opposed to a judgment mistake, and was actually due to an unintentional arithmetic error or an unintentional omission of a quantity of work, labor or material made directly in the compilation of a proposal, which unintentional arithmetic error or unintentional omission can be clearly shown by objective evidence drawn from inspection of original work papers, documents and materials used in the preparation of the proposal sought to be withdrawn. The Offeror shall give notice in writing of his claim of right to withdraw his proposal along with his original work papers, documents, and materials used in the preparation of the proposal to the University's Director of Purchasing, within five (5) days of the conclusion of the proposal opening procedure. If the withdrawal is allowed, the Offeror is prohibited from working on the contract or from bidding on the same project if it is re-advertised.

### 3) Contractual Terms and Conditions

**A) Governing law** - This proposal and the subsequent contract are made under and shall be governed and construed in accordance with the laws of the State of Alabama.

**B) Situs** - The place of the contract, its situs and form, shall be Alabama, where all matters, whether sounding in contract or tort, relating to its validity, construction, interpretation, and enforcement shall be determined.

**C) Standard of Performance** - The Offeror shall give its best effort to the performance of its undertaking under the contract, shall perform all services to be provided hereunder consistent with the highest standards of care, skill, and diligence, and shall employ sound, business-like, effective, and exemplary practices.

**D) Interest of Offeror** - The Offeror covenants that it presently has no interest, direct or indirect, which would conflict in any manner or degree with the performance of its services hereunder. The Offeror further covenants that in the performance of this proposal no such person having such interest shall be employed or engaged.

- E) Key Personnel & Substitutions** - The Offeror shall not substitute key personnel assigned to the performance of the contract without prior written approval by the President, Vice President for Business & Finance, or the department of the University where the services or products are being utilized. The individuals designated as key personnel for purposes of the contract are those specified in the Offeror's proposal. No substitutions shall be permitted after award without the written approval of the University. The University will consider requests for substitutions of personnel and methods only when such requests are accompanied by full and complete technical data and all other information required to evaluate the proposed substitution.
- F) Force Majeure** - The Offeror shall notify the University promptly of any material delay in the performance of the work specified and shall state in writing the revised performance date as soon as practicable after the notice of delay. Neither party shall not be liable for delays in performance unavoidably caused by circumstances beyond its control, such as labor disputes, civil disorders, acts of war, acts of God, governmental action, etc., but it will be liable for all other delays, including specifically that caused by its own fault or negligence.
- 1) In case of default by the Offeror, Alabama A&M University may procure the services from other sources and hold the Offeror responsible for any excess cost occurred thereby. The University reserves the right to require bid bonds or other acceptable guarantees from the successful Offeror without expense to the University. Upon entering of a judgment of bankruptcy of insolvency by or against the Offeror, the University may terminate the contract for cause.
- G) Delays** - When delay occurs due to reasonable causes beyond the control of the Contractor, including but not limited to acts of God, acts of government or any governmental agency, war or war conditions, riot or civil conditions, sabotage, strikes, lockouts, accident, fire, flood, typhoons, hurricanes, explosion, damage to equipment, or facilities, the time for performance and completion of work may be adjusted and extended as required to accommodate those delays and their effect. Upon written receipt of a request and justification for an extension from the Contractor, the University Contracting Officer may extend the time for performance of the Contract or delivery of work herein specified at the University Contracting Officer's sole discretion. The Contractor shall use reasonable diligence to remove or overcome any such causes as expeditiously as possible.
- H) Site Investigation and Conditions Affecting the Work** - The Contractor agrees that to the fullest practical extent it has satisfied itself by its own investigation and research regarding all conditions affecting the work to be performed, labor needed, and that its decision to execute the work is based on such investigation and research in addition to the estimate of the quantities or other information presented herein.

- D) Termination** - If either party shall be in material breach of a provision of this agreement and such breach shall not be cured within sixty (60) days after receipt of written notice thereof, then, in addition to all other remedies available to it, the non-breaching party may elect to terminate this agreement. Notwithstanding the foregoing, neither party shall be considered to have breached a provision hereof if a performance is prevented or delayed by act of God or other circumstance beyond a party's reasonable control.
- J) Contract Rights Upon Termination** - In the event of a termination of this proposal by the University, Offeror shall have ninety (90) days from the date of termination to transfer all data stored in their systems to Alabama A&M University.
- K) Conduct on Premises** - The Offeror agrees that all persons working for or on its behalf whose duties bring them upon the University's premises shall obey all applicable rules and regulations established by the University and shall comply with the reasonable directions of the University's officers. The Offeror shall be responsible for the acts of its employees and agents while on the University's premises and for all injury to persons and damages to property located on University premises caused by its employees and agents. Accordingly, the Offeror agrees to take all necessary measures to prevent such injury and damage. The Offeror shall promptly repair, to the specifications of the University's Facilities Director, any damage that it, or its employees or agents may cause to the University's premises or equipment. In the event the Offeror fails to do so, the University may repair such damage and the Offeror shall reimburse the University promptly for the cost of the repair. The Offeror agrees that, in the event of an accident of any kind on the University's premises involving any of its employees or agents, the Offeror will immediately notify the Director of Human Resources, and thereafter furnish a full written report of such accident.
- L) Contractor Responsibilities** - The Contractor shall be completely responsible for supervising and directing the work under the Contract and all Subcontractors that it may utilize, using adequate skill and attention. Subcontractors who perform work under the Contract shall be responsible to the prime Contractor. The Contractor agrees that it is fully responsible for the acts and omissions of its Subcontractors and of persons employed by the Contractor as it is for the acts and omissions of its own employees.
- M) Subcontracting** - In the event that the Contractor desires to subcontract any part of the work specified herein, the Contractor shall identify in the proposal, the names, qualifications, and experience of the proposed Subcontractors. Any changes in Subcontractors after award of the Contract shall be subject to approval by the University.

No portion of the work shall be subcontracted without prior written consent of the University, and any Subcontractors must be identified as per the paragraph above.



The Contractor shall submit to the University for approval and attachment to the Contract, a list of Subcontractors and their required signed certifications and contact information. During the period of performance, the Contractor shall not substitute Subcontractors and/or key personnel without the written approval of the University. The Contractor shall notify the University within five (5) calendar days after the occurrence of any of these events and provide information as to the circumstances necessitating the proposed change, new Subcontractor information and other information as requested.

Proposed substitutions must have comparable qualifications and experience to those being replaced. The University will notify the Contractor within ten calendar days after the receipt of all required information if this change is approved and the University and the Contractor shall subsequently amend the required Contract documents.

- N) **Contractor Licenses and Permits** - Without additional cost to the University, the Contractor shall be responsible for obtaining, and maintaining, any and all necessary licenses and permits, and complying with all applicable Federal, State, and Local laws in connection with the performance of this work.
- O) **Care of Property** - The Offeror agrees that it shall be responsible for the proper custody and care of any property furnished it for use in connection with the performance of the contract or purchased by it for the contract and will reimburse Alabama A&M University for loss of damage of such property.
- P) **Compliance with Law** - The Offeror shall comply with all laws, ordinances, codes, rules, regulations, and licensing requirements that are applicable to the conduct of its business, including those of federal, state, and local agencies having jurisdiction and/or authority.
- Q) **Non-discrimination** - Operator agrees that it shall not, with respect to any activity carried out on the premises of the University or relating in any way to the agreement, discriminate unlawfully against any person on the basis of race, color, national origin, religion, sex, age, disability, or handicap. The equal opportunity clauses required under Executive Order 11246 and regulations issued thereunder are made a part of the agreement by reference.
- R) **Insurance** - The Offeror is only responsible for general property risks of accidental loss to the building, and/or other equipment or furnishings owned by the University and provided to the Offeror under the contract, except when caused by Offeror negligence.
- S) **Entire Agreement** - This proposal and any documents incorporated specifically by reference represent the entire agreement between the parties and supersede all prior oral or written statements or agreements. This Request for Proposals, any addenda thereto,

and the Offeror's proposal are incorporated by reference as though set forth verbatim. All requirements, terms, conditions, provisions, representations, guarantees, and warranties contained herein shall survive the contract expiration or termination date unless specifically provided otherwise herein, or unless superseded by applicable Federal or State statutes of limitation.

- T) Invoicing and Payment** - Contractor shall submit invoices at the end of each monthly billing period. Invoice amounts shall be based on the Contractor's services rendered. Contractor shall offer the University credit terms of Net 30 for each invoice. Hard copy invoices should be sent via USPS mail to:

Alabama A&M University  
Accounts Payable  
Patton Hall, Room 105  
Normal, AL 35762

Or electronically by email to [accounts.payable@aamu.edu](mailto:accounts.payable@aamu.edu)

- U) Amendments** - This proposal may be amended only by written amendments executed by Alabama A&M University.
- V) Request for Proposal** - Offerors must be aware that this is a request for offers, not a request to contract, and Alabama A&M University reserves the right to reject any and all proposals when such rejection is deemed to be in the best interests of the University.

#### 4) General Conditions and Guidelines

- A) Requirements:** Alabama Agricultural and Mechanical University ("AAMU", "the Awarding Authority") must receive each Offeror's proposal package by mail or hand delivered no later than 2:00 P.M. Central Time on the proposal submission deadline, which will also be the date and time of the proposal opening. Unless otherwise noted, the proposal opening will take place at:

Alabama A&M University  
Purchasing Department  
4900 Meridian Street  
Patton Hall, Room 305  
Normal, AL 35762

All proposals received must be provided in a sealed envelope. (Ala. Code § 41-16-54 (b)) A faxed or emailed proposal does not meet the requirements of the statute because it is not sealed, and all such proposals will be deemed ineligible for award. (Attorney General's Opinion # 91-016)

Mailed sealed proposals sent to the Purchasing Department by logistics carriers FedEx, DHL, or Airborne Express must be sent to the following address:

Alabama A&M University  
Purchasing Department  
4900 Meridian Street  
Patton, Hall, Room 305  
Normal, AL 35762

Mailed, sealed proposals sent to the Purchasing Department by the United States Postal Service (USPS) must be sent to the following address:

Alabama A&M University  
Purchasing Department  
P.O. Box 1627  
Normal, AL 35762

**B) Proposal Preparation:** Alabama Agricultural and Mechanical University proposal forms must be completed and returned as a part of the bid quote/proposal. Proposals should be as thorough and detailed as possible so that AAMU may be able to properly evaluate a bidder's capabilities to provide the required products or services. All bidders must send descriptive literature and/or manufacturer's specifications along with any supplemental specifications necessary to compare the items proposal with the requirements set forth in the proposal form. **All proposals must be submitted within a sealed package with the bid number, opening date and time, and bidder's name and address clearly indicated on the envelope.** Bidders are required to submit all items required in the proposal package. *Please submit 4 hard copies of the proposal as well as one electronic copy.*

An authorized representative of the Bidding Agency shall sign RFP documents. All information requested must be submitted. Failure to submit all information requested may result in rejection of the proposal. Mandatory requirements are those required by law or regulation or are such that they cannot be waived and are not subject to negotiation.

All supporting documentation submitted with the proposal should be bound in that single volume.

Ownership of all data, materials, and documentation originated and prepared for the University pursuant to the RFP shall belong exclusively to AAMU and be subject to public review.

- C) **Oral Presentation:** Bidders who submit a proposal in response to this RFP may be required to give an oral presentation of their proposal to the Awarding Authority. This will provide an opportunity for the Bidding Agency to clarify or elaborate on the proposal but will in no way change the original proposal. If an oral presentation is to be required, the Awarding Authority will schedule the time and location of these presentations. Oral presentations are an option of the Awarding Authority and may not be required to be conducted.
- D) **Bid Bonds:** It may be required for any contract exceeding \$10,000 that the bidder submit with his or her bid a bid bond payable to Alabama A&M University in the amount not less than five percent (5%) of the base proposal to not exceed \$10,000. Bid bonds must be submitted in a form of a cashier's check, certified check, postal money order, irrevocable letter of credit, or U.S. Treasury Notes in lieu of a bid bond. No personal checks or company checks will be accepted. If a bid bond, when required, is not included in a bid package, the bidder's bid package will not receive further consideration. For this RFP, a bid bond will not be required.
- E) **Award:** Alabama Agricultural and Mechanical University ("AAMU", "the Awarding Authority") reserves the right to accept or to reject any or all proposals and is not bound to accept the lowest bid if that bid is contrary to the best interests of the University. In making an award, intangible factors such as a bidder's service, integrity, conformity with specifications, transportation charges, terms of delivery, facilities, equipment, reputation, and past performance history will be weighed along with the quality displayed in the samples submitted (Ala. Code § 41-16-57 (a)). Bids may be awarded either item by item, in product groups, or all or none, whichever appears to be in the best interests of the University. Selection shall be made of one bidder deemed to be fully qualified and best suited among those Bidders that submitted proposals on the basis of the evaluation factors included in this RFP. Financial criteria shall be considered, but will not be the sole determining factor. After reviews have been conducted, the Awarding Authority shall select the Bidding Agency which has made the best proposal and shall award the proposal to that Bidding Agency. The Awarding Authority may cancel this RFP or reject any and all proposals at any time prior to an award.

A proposal accepted in error as the lowest responsible proposal is null and void and AAMU, upon discovery of the error, may accept the lowest proposal and award the contract to that bidder. (Attorney General's Opinion # 2002-071)

Under Ala. Code § 41-16-57 (c), the Awarding Authority may consider lifecycle costs in making its determination of the lowest responsible bidder.

Under Ala. Code § 41-16-57 (b), the Awarding Authority shall give preference to commodities produced in Alabama or sold by Alabama companies provided there is not a

loss in price or quality. However, when the lowest bidder is a foreign entity, meaning that the Offeror does not have a place of business within the State of Alabama, AAMU may award the contract to an “in-state” responsible bidder if his or her proposal is within ten percent (10%) of the foreign entity’s lowest responsible proposal. AAMU may also award the contract to any of the following “in-state” responsible Bidders that are within ten percent (10%) of the foreign entity lowest bidder:

- 1) A woman-owned enterprise
- 2) A small business enterprise
- 3) A minority-owned business enterprise
- 4) A veteran-owned business enterprise
- 5) A disadvantaged-owned business enterprise

If an “in-state” Offeror is not within ten percent (10%) of the foreign entity lowest responsible bidder, the contract will be awarded to the foreign entity.

All Proposals must remain valid for a minimum period of ninety (90) days after the proposed Proposal Due Date. No Proposal may be modified or withdrawn by the Offeror during this period unless prior written permission is granted by the University.

The University reserves the right to request additional information from the Offeror at any time during the selection process. The University also reserves the right to extend by thirty (30) days the Proposal of any Offeror, at no additional cost to the University, to allow for the completion of the final contract documents. If the notification of selection of a Offeror or request for time extension has not been made by the University after ninety (90) days, Offerors may, at their discretion, withdraw their Proposals or provide the University with written extensions of time.

The Purchasing Department of the University is the only agency authorized to award a contract for the proposed purchases. All pertinent State of Alabama purchasing codes and University policies and procedures apply.

**F) Second Lowest Responsible Bidder:** An Awarding Authority can award the proposal to the second lowest responsible bidder if the lowest responsible bidder defaults on the contract after the award has been made, but only under any of the following circumstances:

- 1) The lowest responsible bidder notifies the Awarding Authority in writing that he or she will no longer comply with the contract’s terms.
- 2) The Awarding Authority documents the default in writing.

The second lowest responsible bidder shall only receive the award given that he or she agrees to all the terms and conditions in the original proposal.

- G) Proposal Withdrawal:** No proposals may be withdrawn without approval from Alabama Agricultural and Mechanical University's Purchasing Department. Any requests for withdrawal must be in writing to the Purchasing Department within five (5) days after the proposal opening date with justification or reason for the withdrawal. More than two (2) such requests could result in removal from our proposal list. No proposal may be withdrawn after the issuance of a purchase order. If a withdrawal is made after the purchase order is issued, the Offeror will be considered in default. Refer to "Default of Contractor."

Alabama Agricultural and Mechanical University may remove any Offeror from the Bidders List after a Offeror fails to respond to three consecutive Invitation to Bid or RFP requests.

- H) Proposal Rejection:** The University expressly reserves the right to reject any or all proposals or any part of a proposal, and to re-solicit the services in question, if such action is deemed to be in the best interest of the University.

Proposals which fail to meet the solicitation requirements, or which are incomplete, conditional or obscure, or which contain additions not called for, erasures, alterations or irregularities of any kind or in which errors occur, or which contain abnormally high or abnormally low prices, for any class or item of work, may be rejected as invalid at the University's discretion.

The receipt of more than one proposal from the same Offeror, whether or not the same or different names appear on the signature page, shall result in none of the Offeror's proposal(s) being considered.

The Awarding Authority may reject any proposal if the price is deemed excessive or the quality of the product inferior. (Ala. Code § 41-16-57 (c)) In the event only one bidder responds to an invitation to proposal, the Awarding Authority may reject the proposal and negotiate the purchase or contract, provided that the negotiated price is lower than the proposal price and there are no change in specifications. (Ala Code § 41-16-50 (a) and Attorney General's Opinion # 98-140). In the event only one bidder responds to an invitation to proposal, the Awarding Authority may also advertise for and seek other competitive proposals. Where only one responsible and responsive proposal is received, AAMU may only negotiate for a price lower than the single proposal received.

- I) Prices and Payment Terms:** Bidders should quote applicable cash discounts. The University will not take into consideration in the proposal evaluation any cash discount of

less than thirty (30) days of duration. However, we will take advantage of all discounts for which we are eligible. Identify these discounts in your proposal response. Proposals containing “payment in advance” or “cash on delivery (COD)” requirements may be rejected.

- J) Applicable Law:** It is agreed that this quotation is valid to the extent that it does not violate the constitution or the laws of the State of Alabama.

Bidder represents and warrants that all article and services covered by this proposal meet or exceed the safety standards established and promulgated under the Federal, Occupational Safety and Health Act of 1970, No. 2006, and its regulations in effect or proposed as the date of this proposal.

The furnishing of materials, supplies, equipment, or service to Alabama Agricultural and Mechanical University under this purchase order, contract, solicitation for proposals, or construction specification constitutes assurance by the Offeror or contractor of his compliance with applicable provisions of an pertinent regulations promulgated under Executive Order 11246, date September 28, 1965 issued by the President of the United States of America, and Public Law 88-352, 88 th Congress, the “Civil Rights Act of 1964.”

- K) Non-Collusion:** Any agreement or collusion among Bidders or prospective Bidders in restraint of freedom of competition, by agreement to proposal at a fixed price or to refrain from bidding, or otherwise, shall render the proposals of such Bidders void. Each bidder certifies that he has not been a party to such an agreement by signing this proposal.
- L) New Products:** Unless specifically called for in the proposal, all products for purchase must be new, never previously used, and the current model and/or packaging. No re-manufactured or refurbished, demonstrator, used, or irregular product will be considered for purchase unless otherwise specified in the proposal. The manufacturer’s standard warranty will apply unless otherwise specified in the proposal. All requests should be supplied complete, ready to be installed, including all cabling and connectors, where applicable.
- M) Bonds:** Bid bond and/or performance security bond, when required will be indicated.
- N) Proposal Submission:** Failure to submit a proposal on the official Alabama Agricultural and Mechanical form provided for that purpose shall be a cause for rejection of the proposal. Return of the complete document is required. Modification of or additions to any portion of the solicitation may be cause for rejection of the proposal; however, AAMU reserves the right to decide, on a case-by-case basis, in its sole discretion, whether or not to reject such a proposal as non-responsive.

All information shall be typewritten or handwritten in the appropriate spaces on the forms. Mistakes may be crossed out and corrections inserted before submission of your proposal. Corrections shall be initialed in ink by the person signing the proposal.

**All proposals must be submitted in a sealed envelope bearing on the outside the name and address of the Offeror, proposal number, name of the project, and date.**

All proposals must be signed. Failure to do so will result in rejection of the proposal.

The University reserves the right to ask any Offeror to clarify its offer.

- O) Indemnification:** Offeror agrees to indemnify and hold harmless Alabama A&M University, its officers, agents, servants, employees, successors, and/or assigned from all liability, losses, claims, demands, actions, debts, and expenses of every name and nature for personal or bodily injury including any resulting in death, damage to property, and/or other injury of damage arising out of or as a consequence of its acts or omissions in performing under this Agreement, its presence on the University's premises, or the existence of this Agreement or any matter related hereto. This indemnification agreement shall include all costs, including reasonable attorney's fees and court costs, incurred by the University in connection with the defense against any such claim of liability.
- P) Delivery:** Time of delivery shall be stated as the number of calendar days following receipt of the order by the Offeror, to receipt of the goods by Alabama Agricultural and Mechanical University.

Delivery time may be a criterion in awarding proposals. Specify earliest possible delivery after receipt of order. Failure to deliver within the time the Offeror specified in the proposal will constitute a default and may cause cancellation of the contract. Refer to "Default of Contractor."

All prices quoted are to include Free on Board (F.O.B.) shipping to Alabama Agricultural and Mechanical University, Central Receiving Building, 453 Buchanan Way, Normal, AL 35762 (unless another F.O.B. point is stated by the University on the proposal form). The successful bidder must assume all responsibility for damage in transit. When installation is required, it will be stated in the proposal requirements. If you are not quoting a delivered price, you must indicate your shipping provider / logistics carrier and all related transportation costs itemized in your proposal for evaluation purposes.

- Q) Proposal Terms:** Bidders must show unit prices, extensions, and total price, where applicable. In the event of a discrepancy between the unit price and the extension, the



unit price shall govern. Proposals shall remain firm for a minimum of thirty (30) days from the date of proposal opening and any exceptions must be clearly stated.

- R) **Proposal Opening:** Bidders may attend the proposal opening, but no information or opinions concerning the ultimate award will be given at the proposal opening or during the evaluation process. After the public opening of this proposal, the results will not be available to Bidders not attending the opening until after an award is made.
- S) **Proposals are Public Record:** All proposals become a matter of public record at proposal award. Alabama Agricultural and Mechanical University accepts no responsibility for maintaining confidentiality of any information submitted with proposal whether labeled confidential or not.
- T) **Standards of Quality:** When a material, article, or piece of equipment is identified in these specifications by reference to manufacturer's or Offeror's name, trade name, catalog, and stock numbers, etc., it is intended merely to establish a standard; and, any material, article or equipment of other manufacturer and Offeror which will perform equally the duties imposed by the general design, provided the material, article, or equipment proposed, is in the opinion of the Purchasing Agent of equal substance and function. It shall not be purchased or installed by the contractor without the Purchasing Agents' written approval.

The bidder is responsible to clearly and specifically indicate the product being offered and to provide sufficient descriptive literature, catalog cuts and technical detail to enable AAMU to determine if the product offered meets the requirements of the RFP. Normally in competitive sealed bidding only the information furnished with the proposal will be considered in the evaluation. Failure to furnish adequate data for evaluation purposes may result in declaring a proposal non-responsive. Unless the bidder clearly indicates in its proposal that the product offered is an "Equal" product, such proposal will be considered to offer the brand name product referenced in the invitation. References to manufacturers, suppliers, catalog numbers, etc. are intended to establish quality standards and does not exclude proposals from others as long as quality standards are met. Offers of equal items must state the brand and quality standard. Alabama Agricultural and Mechanical University will be the sole judge of Equal items offered.

- U) **Offeror Authorization:** Offeror must be an authorized distributor/agent to sell products proposed in this proposal request. When it is deemed to be in the best interest of the University, the Purchasing Department may request an on-site premise visit to examine the facility.
- V) **Default of Contractor:** Where the University has determined the contractor to be in default, the University reserves the right to purchase any or all products or services

covered by the contract on the open market and to charge the contractor with cost in excess of the contract price. Until such assessed charges have been paid, no subsequent proposal from the defaulting contractor will be considered.

- W) Fiscal Funding Clause:** The continuation of this contract is contingent upon the appropriation of funds to fulfill the requirements of the contract by the legislature. If the legislature fails to appropriate sufficient monies to provide the continuation of a contract, the contract shall terminate on the date of the beginning of the first fiscal year for which funds are not appropriated.
- X) Contract Cancellation:** The Purchasing Department has the right to cancel any contract, in accordance with Purchasing Rules and Regulations, for cause, including, but not limited to, the following:
- 1) failure to deliver within the agreed upon contract duration;
  - 2) Failure of the product or service to meet specifications, conform to sample quality, or to be delivered in good condition;
  - 3) misrepresentation by the contractor;
  - 4) fraud, collusion, conspiracy, or other unlawful means of obtaining any contract with the State;
  - 5) Conflict of contract provisions with constitutional or statutory provisions of state or federal law; and
  - 6) any other breach of contract.
- Y) Warranties:** Should merchandise described on this proposal contain a manufacturer's warranty, Bidders must state the warranty terms in the space provided on the proposal. Proposals offered for merchandise when no warranty applies must clearly state: "NO WARRANTY COVERAGE." Warranty information may be criteria in making this award. Failure of Bidders to furnish this data may cause rejection of the complete proposal as being non-responsive.
- Z) Disclosure Statement:** The successful bidder will be required to file with the Purchasing Department a disclosure statement of relationship between contractors/grantees and employees/officials of the University. This form must be completed prior to issuance of the Purchase Order by Alabama Agricultural and Mechanical University.
- AA) Protest of Award:** Any protest by a Offeror must be timely and in conformance with applicable procurement regulations. The fifteen (15) day protest period for responsive Offerors shall begin on the day following the University's written notification to all responding Offerors of the awarded Offeror. Protests must be written and include the name and address of the protester and the number assigned to this RFP by the University and a statement of the grounds for the protest. The protest must be delivered to:

Alabama A&M University  
4900 Meridian Street  
Purchasing Department  
ATTN: Jeffrey Robinson  
Patton Hall, Room 305  
Normal, AL 35762

## **Proposal Scoring**

Each proposal submitted will be graded by an evaluation committee on the criteria displayed below.

<b>Category</b>	<b>Points Available</b>	<b>Score</b>
Experience of Vendor as it relates to product or services	Up to 10 points	
Total Client base and number of years in business	Up to 10 points	
Qualifications and experience of proposed project team including onsite manager	Up to 10 points	
Completeness and responsiveness of Proposal	Up to 15 points	
The ability of the Respondent to provide the Services requested or offered	Up to 15 points	
The quality of the Services being offered by the Respondent	Up to 20 points	
The price for which the Services are offered	Up to 20 points	

## Appendix A: Terms and Definitions

- **“AAMU”, “Alabama A&M”, “Alabama A&M University”** shall mean Alabama Agricultural and Mechanical University located at 4900 Meridian Street North Huntsville, AL. 35811
- **"AAMU-CCN"** The Alabama A&M University Campus Commodity Network is a highly secured, Regulatory Compliance driven, zero-trust network used to facilitate the daily business communication needs of the University. This network houses the data and systems that are essential to the University and are frequently subjected to regulatory or compliance audits for information security purposes.
- **"AAMU-ResNet"** The Alabama A&M University Residential Network is the general internet service provided to the student body for academic and personal use. This network is a secured network, but generally provides only standard residential security measures to ensure that the end user is provided the freedom and flexibility to access internet located resources needed for learning.
- **"AAMU-RotH"** The Alabama A&M University Research on the Hill network is the campus Science DMZ which is used for Research and Education collaboration among researchers, faculty and students. This network is a high-speed, low-latency network that is used to facilitate large data transfers with direct and unfiltered access to Internet2.
- **“AAMU-SPORTS”** The Alabama A&M University Sports Network is a physically and logically segmented network designed for use by the AAMU Athletics Dept. and it’s Offerors. The use of this network will be governed by the AAMU Athletics Dept, and supported by the AAMU ITS dept.
- **"Academic Year"** The nine (9) calendar months beginning mid-August of each year and ending mid-May of the following year.
- **"Appendix", or "Appendices"** are written or graphic instructions issued by Alabama A&M University prior to the receipt of Proposals that modify or interpret the Request for Proposal documents by addition, deletion, clarification, or correction.
- **"Border Gateway Protocol" or "BGP"** A standardized exterior gateway protocol designed to exchange routing and reach-ability information among autonomous systems (AS) on the Internet.
- **“Bulk Wireless Services”** Wireless access services provided by Offeror.

- **“CBRS”** Shall mean Citizens Broadband Radio Service or utilization of the 3.5GHz RF band ranging in frequency from 3550 – 3700 MHz.
- **"Competitive Negotiation"** The method authorized in Article 3 of The Code of Alabama 1975 Title 41 Chapter 16 Section 50
- **“Contract” and “Resulting Contract”** are used interchangeably and are defined as the official agreement and contract award resulting from the Successful Offeror’s response to this Request for Proposal.
- **"Cross-connect"** Physical cables that connect two different networks within a data center providing services such as dark fiber, wavelength, MPLS, or other point-to-point services are available with a single cross connect.
- **“Construction”** the physical installation of network related components, cabling, materials, and electrical power required to interconnect the network components which are subject to the AAMU Structured Cabling Standard and all federal, state and local building codes governing such installations.
- **“Contractor”, “Offeror” or “Vendor”** is defined as a person, company, or corporation with the capability in all respects to perform fully the contract requirements and with the integrity and reliability ensuring good faith performance.
- **“DAS”** Shall mean Distributed Antenna System that is a network of spatially separated antenna nodes connected to a common source via a transport medium that provides wireless service within a geographic area or structure.
- **"Demilitarized Zone" or "DMZ"** - A physical or logical sub-network that contains and exposes an organization's external-facing services to an un-trusted network, usually a larger network such as the Internet.
- **“E-Sports Network”** A high-speed, low latency physical or logical sub-network that is used primarily for the purposes of competitive online video gaming that reduces lag and jitter experienced on traditional enterprise or residential networks.
- **"FCC"** - Federal Communications Commission
- **“Fiscal Year”** when used herein is defined as the twelve (12) calendar months beginning October 1 of each year and ending on September 30 of the following year.

- **"Governing Law"** The contract and all of the rights and obligations of the parties hereto will be construed, interpreted and applied in accordance with, governed by and enforced under the laws of the State of Alabama.
- **"Local Area Network" or "LAN"** - A network spanning a small area, usually within the confines of a single facility.
- **"Multi-Protocol Label Switching" or "MPLS"** - a mechanism for routing traffic within a telecommunications network, as data travels from one network node to the next.
- **"Network Access Control" or "NAC"** A platform capable of authenticating, authorizing, and accounting for each user and device that attempts connection to the attached network or networks.
- **"Network Realization"** The stage of network planning and design following network synthesis when the network architect tests the flow of data through the network and adjusts the physical circuit plan to produce a more cost-effective and reliable network.
- **"Network Synthesis"** The stage of network planning and design following topological design when the network architect decides how to route the information through the network components.
- **"Offer" or "Proposal"** are defined as the Offeror's response to this Request for Proposal. The term "Offeror" is defined as the individual or entity submitting a Proposal.
- **"Offeror"** Shall mean the company, vendor, proposer, provider, or other qualifying entity submitting a proposal within the guidelines of the RFP as specified above.
- **"Organization"** The entity issuing the RFP, being Alabama Agricultural and Mechanical University hereby known as "Alabama A&M University", or as "AAMU" and located at 4900 Meridian Street North in Huntsville, Alabama 35811
- **"Price"** The amount that the organization will deliver to the Offeror/bidder for the product or service described in the RFP.
- **"Purchasing Agency"** is defined as Alabama A&M University, Division of Purchases & Stores, 4900 Meridian Street N, Huntsville, AL 35811.
- **"Purchasing Official"** is defined as Alabama A&M University's designated contracting representative. For this RFP it is the Chief Information Officer.

- **"Request for Proposal" or "RFP"** - The request for proposal issued to solicit bids for the product or service described herein as is required in Article 3 of The Code of Alabama 1975 Title 41 Chapter 16 Section 54
- **"Requester"** shall mean the Alabama Agricultural and Mechanical University Information Technology Services Department
- **"RTLS"** Shall mean Real-Time Location Services to include Bluetooth, CBRS, Distributed Antenna System, GIS, GLONASS, GPS, GSM, IPS, NFC, LiFi, Mobile Phone Tracking, RFID, WiFi, or WiMAXX
- **"Services"** shall mean Bulk Wireless Services provided by the Offeror.
- **"System"** shall mean all hardware, licensing, materials, services, and software provided to meet the requirements of this RFP.
- **"Term"** shall mean the period of effectiveness of this Agreement as set forth herein.
- **"Topological Design"** The stage of network planning and design when the network architect decides where to place network components and how to connect them.
- **"Unit"** shall mean a residential condominium or apartment dwelling unit at the Premises.
- **"Video Gaming Network"** A high-speed, low latency physical or logical sub-network that is used primarily for the purposes of recreational online video gaming that reduces lag and jitter experienced on traditional enterprise or residential networks.
- **"Wide Area Network" or "WAN"** - A network spanning a large area, usually linking servers across metropolitan, regional, national or international boundaries through leased telecommunications lines.



# Appendix B: AAMU Campus Fiber Plant



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# Appendix C: AAMU Network Segments

## 1. AAMU-CCN

BLDG #	ABBR	Building Name	Street	City	State	Zip
1	CAMB	Crump Agricultural Mechanics Building	4103 Meridian St NW	Normal	AL	35762
4	BGH	Bibb Graves Hall	355 Buchanan Way NE	Normal	AL	35762
8	SOB	School of Business	4230 Morrison Cir NE	Huntsville	AL	35811
9	CL	Carnegie Library	345 Buchanan Way NE	Normal	AL	35762
10	ARW	Aramark Receiving Warehouse	430 Buchanan Way NE	Normal	AL	35762
11	CSH	Carter Science Hall	130 Parker Dr. NE	Normal	AL	35762
12	CCX	Carver Complex	4240 Morrison Cir NE	Normal	AL	35762
13	BTS	BTS Transfer Station	4241 Morrison Cir NE	Normal	AL	35762
14	CCU	Councill Credit Union	441 Buchanan Way NE	Normal	AL	35762
15	VMC	V. Murray Chambers Science Building	4235 Morrison Cir NW	Huntsville	AL	35811
16	CTC	Councill Training Center (Athletics / ROTC)	4107 Meridian ST NW	Normal	AL	35762
17	WHCH	W. H. Councill Hall	315 Buchanan Way NE	Huntsville	AL	35811
18	LCS	Louis Crews Stadium	200 Bates Cir NW	Huntsville	AL	35811
19	DEXT	Dawson Extension Building	306 Akimbo Rd NE	Huntsville	AL	35811
20	DDH	Drake Hall	335 Buchanan Way NE	Huntsville	AL	35811
21	DMLRC	Drake Memorial Learning Resource Center	115 Drake Dr. NE	Huntsville	AL	35811
22	TMEG	T. M. Elmore Gym	4225 Davis Dr. NW	Huntsville	AL	35811
23	SOE	A. J. Bond Hall (School of Engineering)	4000 Bond Dr NE	Huntsville	AL	35811
24	ARCB	Agricultural Research Center Building	329 Akimbo Rd NE	Huntsville	AL	35811
25	FIC	Foster Irradiation Center	4250 Morrison Cir NE	Huntsville	AL	35811
27	FLG	Frank Lewis Gym	425 Buchanan Way NE	Normal	AL	35762
30	GH	Green Houses	315 Akimbo Rd NE	Huntsville	AL	35811
33	HCB	Honors Center Building	316 Buchanan Way NE	Huntsville	AL	35811
36	HES	Hester House	440 Buchanan Way NE	Normal	AL	35762
37	EKMF	Eugene Kendrick Maintenance Facility	445 Buchanan Way NE	Huntsville	AL	35811
38	RLUC	Ralph Lee University Center	360 Buchanan Way NE	Huntsville	AL	35811
39	MVB	McCalep Vocational Building	375 Buchanan Way NE	Normal	AL	35762
40	MCCB	McCormick Building	308 Buchanan Way NE	Normal	AL	35762
41	MEA	Mechanical Engineering Annex (Quonset Hut)	111 Holloway Rd NW	Normal	AL	35762
43	MFAB	Morrison Fine Arts Building	4119 Council Blvd	Huntsville	AL	35811
46	TRPA	T.R. Parker Annex (New Classroom Building)	323 Akimbo Rd NE	Normal	AL	35762
47	PHAB	Patton Hall Administration Building	4210 Morrison Cir NE	Normal	AL	35762
50	PSB	Poultry Science Building	465 Buchanan Way NE	Huntsville	AL	35811
52	IWC	INSERVICE Writing Center / Dora's House	4105 Meridian St NW	Huntsville	AL	35811
53	USB	University Services Building	453 Buchanan Way NE	Huntsville	AL	35811
54	HR	Human Resources	444 Buchanan Way NE	Normal	AL	35762
63	KLLC	Knight Living Learning Complex	110 Holloway Rd NE	Huntsville	AL	35811
64	SBA	State Black Archives (Wilson)	300 Buchanan Way NE	Normal	AL	35762
73	HFH	Hobson Field House	201 Bates Cir NW	Huntsville	AL	35811
80	NHSA	Normal Hills Student Apartments	115 Chase Rd NW	Huntsville	AL	35811
98	HWC	Health & Wellness Center	4011 Meridian St NW	Huntsville	AL	35811
99	WTR	W.T. Agricultural Research Station	372 Walker Ln.	Hazel Gree	AL	35752
100	NWC	New Welcome Center	3920 Meridian Street N.	Huntsville	AL	35811

## 2. AAMU-ResNET

BLDG #	ABBR	Building Name	Street	City	State	Zip
26	FLLC	Foster Living Learning Complex	460 Buchanan Way NE	Huntsville	AL	35811
28	NRH	New Residence Hall	4101 Meridian St NW	Huntsville	AL	35811
34	HRH	Hopkins Residence Hall	410 Buchanan Way NE	Huntsville	AL	35811
38	RLUC	Ralph Lee University Center	360 Buchanan Way NE	Huntsville	AL	35811
42	MRH	Morris Residence Hall	440 Buchanan Way NE	Huntsville	AL	35811
44	PRH	Palmer Residence Hall	325 Buchanan Way NE	Huntsville	AL	35811
56	SRH	Stephens Residence Hall	450 Buchanan Way NE	Huntsville	AL	35811
57	TRY	Terry Residence Hall	326 Buchanan Way NE	Huntsville	AL	35811
58	TGPN	Thigpen Residence Hall	344 Buchanan Way NE	Huntsville	AL	35811
63	KLLC	Knight Living Learning Complex	110 Holloway Rd NE	Huntsville	AL	35811
80	NHSA	Normal Hills Student Apartments	115 Chase Rd NW	Huntsville	AL	35811
98	HWC	Health & Wellness Center	4011 Meridian St NW	Huntsville	AL	35811

## 3. AAMU-RotH

BLDG #	ABBR	Building Name	Street	City	State	Zip
11	CSH	Carter Science Hall	130 Parker Dr. NE	Normal	AL	35762
12	CCA	Carver Complex Annex	305 Akimbo Rd	Normal	AL	35762
15	VMC	V. Murray Chambers Science Building	4235 Morrison Cir NW	Huntsville	AL	35811
19	DEXT	Dawson Extension Building	306 Akimbo Rd NE	Huntsville	AL	35811
20	DDH	Drake Hall	335 Buchanan Way NE	Huntsville	AL	35811
21	DMLRC	Drake Memorial Learning Resource Center	115 Drake Dr. NE	Huntsville	AL	35811
23	SOE	A. J Bond Hall (School of Engineering)	4000 Bond Dr NE	Huntsville	AL	35811
24	ARCB	Agricultural Research Center Building	329 Akimbo Rd NE	Huntsville	AL	35811
25	FIC	Foster Irradiation Center	4250 Morrison Cir NE	Huntsville	AL	35811
30	GH	Green Houses	315 Akimbo Rd NE	Huntsville	AL	35811
33	HCB	Honors Center Building	316 Buchanan Way NE	Huntsville	AL	35811
50	PSB	Poultry Science Building	465 Buchanan Way NE	Huntsville	AL	35811
52	IWC	INSERVICE Writing Center / Dora's House	4105 Meridian St NW	Huntsville	AL	35811
99	WTR	W.T. Agricultural Research Station	372 Walker Lane	Hazel Green	AL	35752

## 4. AAMU-SPORTS

BLDG #	ABBR	Building Name	Street	City	State	Zip
16	CTC	Councill Training Center (Athletics / ROTC)	4107 Meridian ST NW	Normal	AL	35762
18	LCS	Louis Crews Stadium	200 Bates Cir NW	Huntsville	AL	35811
22	TMEG	T. M. Elmore Gym	4225 Davis Dr. NW	Huntsville	AL	35811
27	FLG	Frank Lewis Gym	425 Buchanan Way NE	Normal	AL	35762
38	RLUC	Ralph Lee University Center	360 Buchanan Way NE	Huntsville	AL	35811
73	HFH	Hobson Field House	201 Bates Cir NW	Huntsville	AL	35811
98	HWC	Health & Wellness Center	4011 Meridian St NW	Huntsville	AL	35811
		New Event Center	34° 46'52.7"N 86° 34'50.9"W	Huntsville	AL	35811

# **Appendix D: AAMU Structured Cabling Standard**

- PART 1 - GENERAL

- ↳ RELATED DOCUMENTS

- ✦ Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- ✦ Section 26 01 01 “Basic Electrical Requirements”.
- ✦ Section 26 05 26 “Grounding and Bonding for Electrical Systems”.
- ✦ Section 26 05 29 “Hangers and Supports for Electrical Systems”.
- ✦ Section 26 05 33 “Raceways and Boxes for Electrical Systems”.
- ✦ Section 26 05 44 “Sleeves and Seals for Electrical Raceways and Cabling”.

- ↳ SUMMARY

- ✦ All work under this specification section to be performed by a qualified telecommunications contractor as defined in this section. This includes, but is not limited to, cabling installation, cabling termination, equipment installation, system component labeling, owner coordination, etc. All work performed by a contractor who does not meet the contractor qualifications as defined in this section will be replaced at no expense to the owner.
- ✦ This document describes the products and execution requirements relating to furnishing and installing Telecommunications Cabling at the building. Backbone and horizontal cabling comprised of copper and fiber cabling, and support systems are covered under this document.
- ✦ The Horizontal (workstation) Cabling System shall consist of 4-pair Unshielded Twisted Pair (UTP) Copper Cables to each work area outlet as shown on the plans. The cables shall be installed from the Work Area Outlet to the Telecommunications Room location as called for, and routed to the appropriate rack serving that area and terminated as specified in this document.
- ✦ All cables and related terminations, support and grounding hardware shall be furnished, installed, wired, tested, labeled, and documented by the Telecommunications contractor as detailed in this document or as required for a fully functional system as intended.
- ✦ Product specifications, general design considerations, and installation guidelines are provided in this document. Quantities of telecommunications outlets, typical installation details, cable routing and outlet types will be provided as an attachment to this document. If the bid documents are in conflict, this specification shall take precedence. Any/all work called for in this document or the attachment shall be included in the bid price as if called for in both this document and any/all attachments. The successful contractor shall meet or exceed all requirements for the cable system described in this document

✦ Section Includes:

- Patch cords.
- Telecommunications outlet assemblies.
- Horizontal (workstation) cabling and terminations.
- Cable identification.
- Cable connecting hardware.
- Cross-connects.
- Patch panels.
- Telecommunications equipment racks, cabinets and enclosures.
- Optical fiber panels/enclosures, patch panels and terminations.
- Backbone cabling.
- Telecommunications mounting elements.
- Backboards.
- Copper cable protection units.
- Grounding.
- Fire-stopping.

✦ Related Requirements:

- All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association (latest edition of applicable sections), all local codes, requirements of authority having jurisdiction, and present manufacturing standards.
- All materials shall be UL Listed and shall be marked as such. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.
- All modular jacks, patch cords, patch panels and CAT6A cable performance shall be verified (not just tested) by a third party to be category 6A component and channel compliant.
- Regulatory References:
  - ↳ NFPA 70/NEC (latest edition): National Electrical Code.
  - ↳ ANSI J-STD-607 (latest edition): Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
  - ↳ TIA/EIA-606 (latest revision): Administration Standard for Telecommunications Infrastructure.

- ↳ UL 969 (latest revision): Marking and Labeling Systems.
- ↳ NECA 1 (latest edition): Standard Practice of Good Workmanship in Electrical Construction.
- ↳ BICSI TDMM (latest edition): Telecommunications Distribution Methods Manual.
- ↳ TIA/EIA-569 (latest edition): Commercial Building Standard for Telecommunications Pathways and Spaces.
- ↳ TIA/EIA-568 (latest edition): Cabling Standard.
- ↳ All other regulatory references noted in this document.

- If this document and any of the documents listed above are in conflict, then the more stringent requirement shall apply. The Contractor has the responsibility to determine and adhere to the most recent release when developing the proposal for installation.
- This document does not replace any code, either partially or wholly. The contractor must be aware of local codes that may impact this project.

✦ All cable shall be plenum rated

✦ Allowances to be included with this bid:

- See architectural for allowances

#### ↳ WORK INCLUDED

- ✦ The work included under this specification consists of furnishing all labor, equipment, materials, and supplies and performing all operations and setup necessary to complete the installation of this structured cabling system in compliance with the specifications, drawings and applicable codes/regulatory references. The Telecommunications contractor will provide and install all of the required material to form a complete system whether specifically addressed in the technical specifications or not.
- ✦ The work shall include, but not be limited to the following:
  - Furnish and install a complete telecommunications wiring infrastructure.
  - Furnish, install, and terminate ALL UTP (both ends) and Optical Fiber cable (all pairs, both ends) and Coaxial cable (both ends).
  - Furnish and install all work area patch cords, wall plates, jacks, cables, patch panels and equipment room patch cords.
  - Furnish and install all required cabinets and/or racks and/or enclosures as required or as indicated.
  - Perform link or channel testing (100% of horizontal and/or backbone links/channels) and certification of all components.
  - Furnish test results of all cabling to the owner in electronic (searchable PDF file) and paper format, listed by each closet, then by workstation ID with the close-out documents.

- Adhere and comply with all requirements of connectivity and cabling manufacturer Certification programs.
- Provide owner training and documentation.
- Coordinate with the owner and the engineer for the required telecom room and equipment identification, conduit routes and identifications, cable identification (at the rack and at the work area). Provide and install labeling for all cables using the labeling method detailed on the drawings.
- Furnish any other material required to form a complete system.

## ▾ DEFINITIONS

- ✦ BICSI: Building Industry Consulting Service International.
- ✦ LAN: Local Area Network.
- ✦ CLAN: Campus Local Area Network.
- ✦ RCDD: Registered Communications Distribution Designer.
- ✦ EF: Entrance facility.
- ✦ ER: Equipment Room.
- ✦ CMDF: Campus Main Distribution Frame(s).
- ✦ MDF: Facility Main Distribution Frame. May include the Entrance Facility equipment and/or the Equipment Room equipment.
- ✦ IDF: Intermediate Distribution Frame.
- ✦ EMI: Electromagnetic Interference.
- ✦ Cross-connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- ✦ IDC: Insulation Displacement Connector.
- ✦ UTP: Unshielded Twisted Pair.
- ✦ Outlet/connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- ✦ WAP: Wireless Access Point

## ▾ HORIZONTAL CABLING DESCRIPTION

- ✦ Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called a "permanent link," a term that is used in the testing protocols.
  - Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
  - Bridged taps and splices shall not be installed in the horizontal cabling.

- Splitters shall not be installed as part of the optical fiber or copper cabling system (including coaxial cable).
- ✦ A work area is approximately 100 sq. ft., and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- ✦ The maximum allowable horizontal cable length is 295 feet. This maximum allowable length does not include an allowance for the length of up to 20 feet of patch cord to the workstation equipment or in the horizontal cross-connect.

#### ▾ BACKBONE CABLING DESCRIPTION

- ✦ Backbone cabling system shall provide interconnections between communications equipment rooms, entrance facilities, MDF, IDF and CMDF (where applicable) in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
- ✦ Backbone cabling cross-connects may be located in communications equipment rooms, entrance facilities or MDF. Bridged taps and splitters shall not be used as part of backbone cabling.
- ✦ Performance requirements
  - General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard

#### ▾ ADMINISTRATIVE REQUIREMENTS

- ✦ Coordinate layout and installation of telecommunications cabling with Owner's telecommunications department and LAN equipment and service suppliers.
- ✦ Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.
- ✦ Coordinate cable pathway routes with electrical contractor and all other trades.

#### ▾ SUBMITTALS

- ✦ Contractor shall provide 4 hard copies and an electronic copy (searchable PDF file) of all submittal data required including Product Data, Shop drawings, Informational submittals and samples. Submittals will not be reviewed until complete Structured Cabling submittal package is received.
- ✦ The Structured Cabling contractor shall check all suppliers' submittals regarding measurements, capacity, performance and details to satisfy him/herself that they conform to the intent of the contract drawings and specifications. Submittals package shall bear the stamp of approval of the Structured Cabling contractor as evidence that the submittals have been checked by him/her. Submittals will not be reviewed without the Structured Cabling contractor's stamp.
- ✦ See Section 26 01 01 for additional submittal requirements.



- ✦ Product Data: For each type of product including but not limited to: Patch cords, jacks, face plates, cables, patch panels, racks/cabinets
  - Work shall NOT proceed without the engineer’s approval of the submitted items.
  - For all cable types used include:
    - ↳ Performance characteristics.
    - ↳ Nominal outside diameter.
    - ↳ Minimum bending radius.
    - ↳ Maximum pulling tension.
  - For all racks/cabinets and associated accessories include:
  - Construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets.
  - Rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- ✦ Shop Drawings
  - Submit a typical outlet assembly and labeling configuration.
  - Wiring diagrams to show typical wiring schematics including the following:
    - ↳ Cross-connects.
    - ↳ Patch panels (copper and fiber)
    - ↳ Patch cords and jumpers.
    - ↳ Work area outlet.
    - ↳ Active network equipment.
  - Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
  - Cable pathway layout, showing raceway route and type (cable tray, J-hooks, conduit, sleeves and pull-boxes) to scale, with relationship between the pathway and adjacent structural, electrical, and mechanical elements. Include the following:
    - ↳ Vertical and horizontal offsets and transitions.
    - ↳ Clearances for access above and to side of cable trays and J-hook pathway.
    - ↳ Vertical elevation of pathway above the floor or bottom of ceiling structure.

- ↘ Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray/J-hooks and support elements.
  - ↘ Load calculations to show dead and live loads as not exceeding manufacturer's rating for conduit support elements
- Detail equipment assemblies and indicate dimensions, weights, loads, recommended clearances, method of field assembly, components, and location and size of each field connection.
- Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
- Grounding: Submit a scale drawing of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.
- Contractor shall include in the submittal package 1-1/2" scale equipment rack elevations (front) for all equipment racks/cabinets. Elevations must include and identify (by manufacturer and model# where applicable) the following:
  - ↘ Individual equipment rack identification
  - ↘ All rack-mounted equipment
  - ↘ All rack-mounted cable management
  - ↘ All rack-mounted Power Distribution Units
  - ↘ All rack-mounted ground bars
  - ↘ All blank filler plates
  - ↘ All rack mounted Uninterruptible Power Supplies (UPS)
- Contractor shall include in the submittal package 1/2" scale drawings of each telecom room. Drawings must include and identify (by manufacturer and model# where applicable) the following:
  - ↘ All equipment rack(s) and clearances.
  - ↘ All backboard(s).
  - ↘ All cable tray/cable runway.
  - ↘ Wall mounted ground bar.
  - ↘ All raceway penetrations.
  - ↘ All riser conduits.
  - ↘ All punch-down blocks.

- ↳ All floor or wall-mounted Uninterruptible Power Supplies (UPS).
  - ↳ Receptacle locations.
  - ↳ All fire-stopping material/fittings
  - ↳ All other equipment indicated on drawings or existing (where applicable).
- Contractor shall include in the submittal package ½” scale interior elevations of all walls in each Comm room. Elevations must include and identify (by manufacturer and model# where applicable) the following:
  - ↳ All backboards.
  - ↳ All wall mounted equipment.
  - ↳ All raceway penetrations.
  - ↳ All riser conduits.
  - ↳ All wall mounted cable management (D-rings).
  - ↳ All backbone cabling.
  - ↳ All receptacles.
  - ↳ All punch-down blocks.
  - ↳ Wall mounted ground bar(s).
  - ↳ All fire-stopping material/fittings.
- **Substitutions: Any proposed substitution must be submitted a minimum of 10 days prior to the bid. Any proposed substitution must be fully demonstrated to owner’s IT department prior to the bid and must be shown to FULLY meet or exceed all relative specifications and performance criteria of the specified product. Any product or component that has not been demonstrated to the full satisfaction of the owner’s IT department or has not been deemed acceptable by the owner’s IT department prior to the bid will not be accepted. The Owner and architect/engineer reserves the right to reject and deny any substitution that it may, in its sole discretion, deem unequal, and the findings in this regard shall be accepted by the bidder as final and binding**

✦ INFORMATIONAL SUBMITTALS

- The following informational submittal information must be provided with the submittal package:
  - ↳ Qualification Data: For all telecommunications contractor’s personnel on site, qualified layout technicians, installation supervisor, Installers, telecommunications contractor’s field quality inspector and RCDD. Personnel qualification data shall include all BICSI certifications as well as all current cabling/connectivity manufacturer’s certifications.

- ✦ Contractor shall submit names of all personnel to be performing work related to this project
  - ✦ Contractor shall submit a copy of the current cabling/connectivity manufacturer's certification documents for all contractor personnel to be involved with this project.
  - ✦ Contractor shall submit a copy of all BICSI certification documents for all contractor personnel to be involved with this project.
- ↳ Seismic Qualification Certificates: For equipment frames from manufacturer.
    - ✦ Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
    - ✦ Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions. Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based.
    - ✦ Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- ↳ Contractor must submit the following information regarding the 3 projects of similar size and scope (see "Quality Assurance"):
    - ✦ Project name.
    - ✦ Project location.
    - ✦ Project owner. Include contact information (name, address, telephone and e-mail) for owners IT department or responsible party as it relates to structured cabling.
    - ✦ Approximate value of project structured cabling.
    - ✦ Approximate drop count.
    - ✦ Contact information (including name, address, telephone and e-mail) of electrical or general contractor directly responsible for the structured cabling subcontractor.
- ↳ Samples: jacks, jack assemblies, icons, cable (1 foot section), patch cable (3 foot length) and faceplate. Provide one of each type and size of each product submitted.
- CLOSEOUT SUBMITTALS
    - ↳ System Labeling Schedules: Electronic copy of labeling schedules in searchable PDF file format.
    - ↳ All testing records.
    - ↳ All as-built drawings.

- ☞ All warranty materials.
    - ☞ Other records as called for within this specification.
  - MAINTENANCE SUBMITTALS
    - ☞ Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
      - ✦ Patch cables: Ten of each length used.
      - ✦ Jacks: Ten of each type used.
      - ✦ Faceplates: Ten of each type/port capacity used.
      - ✦ 4 pair UTP Cable: One 500ft reel of each type used.
      - ✦ Patch-Panel units: Two of each type used.
      - ✦ Power distribution units: Two of each type used.
  - ☞ QUALITY ASSURANCE
    - ✦ Installer Qualifications: The successful telecommunications contractor shall be a company specializing in communication cabling installation and shall have been in business for a minimum of 5 years under the same name and with the same board of directors/management. Contractor must have successfully completed a minimum of 3 projects of similar size and scope within the last 5 years. At least 30 percent of the copper installation and termination crew must be certified by BICSI and the cable/connectivity manufacturer with a Technicians Level of Training. At least 10 percent of the optical fiber installation and termination crew must be certified by BICSI and the cable/connectivity manufacturer in optical fiber installation and termination practices. The contractor must have an RCDD on staff in responsible charge of the project. Provide all contact information for the RCDD as this will be the point of contact for the project.
      - Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of an RCDD.
      - Installation Supervision: Installation shall be under the direct supervision of a BICSI certified Commercial Installer, Level 2, who shall be present at all times when work of this Section is performed at Project site.
      - Contractor's field quality inspector shall be the RCDD who is in responsible charge of the project or the on-site installation supervisor. Contractor's field quality inspector shall provide bi-weekly on-site inspection reports to the engineer documenting this discipline's project progress. These reports shall be submitted to [INS@aamu.edu](mailto:INS@aamu.edu). Report shall include work that has been completed, work that is in progress, work remaining and estimated date of completion for each phase of work for the project. Report shall include photographs of completed work and work in progress. Report shall include telecommunications contractor's personnel on-site for the duration of

time included in the report. The report shall also include work by other trades to be utilized for the completion of the work specified in this section.

- Structured cabling contractor shall have, on site for final inspection, the RCDD who is in responsible charge of the project or the on-site installation supervisor. If one of the requested personnel is not present at the final inspection, the structured cabling contractor will be charged for time (\$125.00/hour) and mileage (\$0.56/mile) for the EE Group, Inc. representative for the missed inspection. This charge must be paid prior to any subsequent visits to the site.
- Testing supervisor shall be currently certified by BICSI as an RCDD and shall be on-site to supervise all testing.
- ✦ The cabling/connectivity manufacturer shall extend a manufacturer's warranty for all products installed, this project, to the end user once the telecommunications contractor fulfills all requirements under this specification. See section 3 of this document for full warranty requirements.
- ✦ Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- ✦ Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- ✦ Grounding: Comply with ANSI-J-STD-607-A.

#### ☒ DELIVERY, STORAGE, AND HANDLING

- ✦ Delivery and receipt of products shall be at the site.
- ✦ Cable shall be stored according to manufacturer's recommendations at a minimum. In addition, cable must be stored in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 40 degrees F., the cable shall be moved to a heated (50 degrees F. minimum) location. If necessary, cable shall be stored off site at the contractor's expense.
- ✦ If the telecommunications contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner.
- ✦ Test all cables upon receipt at Project site.
  - Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.
  - Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in closeout submittals.
  - Test each pair of UTP cable for open and short circuits.

#### ✦ PROJECT CONDITIONS

- Environmental Limitations: Do not deliver or install ANY cables or connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### ✦ DRAWINGS

- It shall be understood that the details and drawings provided with the specification package are diagrammatic. They are included to show the intent of the specifications and to aid the telecommunications contractor in bidding the job. The telecommunications contractor shall make allowance in the bid proposal to cover whatever work is required to comply with the intent of the plans and specifications and provide a fully functional system as intended.
- The telecommunications contractor shall verify all dimensions at the site and be responsible for their accuracy.
- Prior to submitting the bid, the telecommunications contractor shall call the attention of the Engineer to any materials or apparatus the telecommunications contractor believes to be inadequate and to any necessary items of work omitted.

#### • PART 2 - PRODUCTS

##### ↳ PRODUCTS

- ✦ Due to the nature and type of communications all products, including but not limited to faceplates, jacks, patch panels, racks, punch-down blocks, and patch cords, for the purpose of this document, shall be manufactured by Panduit. All copper and optical fiber cable products shall be manufactured by Panduit.

##### ↳ TELECOMMUNICATIONS OUTLET/CONNECTORS

- ✦ Work area cables shall each be terminated at their designated work area location in the connector types specified on drawings/described in the subsections below. Included are modular telecommunication jacks. These connector assemblies shall snap into a faceplate.
- ✦ The Telecommunications Outlet Assembly shall accommodate a minimum of two (2) modular jacks plus any additional accommodations for specific locations as noted in the plans for optical fiber and/or additional copper cables as necessary
- ✦ A blank filler will be installed when extra ports are not used.
- ✦ A dust cap shall be provided on all modular jacks with the circuit number on the identifier strip.
- ✦ Multiple jacks that are identified in close proximity on the drawings (but not separated by a physical barrier) may be combined in a single assembly. The telecommunications contractor shall be responsible for determining the optimum compliant configuration based on the products proposed.

- ✦ The same orientation and positioning of jacks and connectors shall be utilized throughout the installation. Prior to installation, the telecommunications contractor shall submit the proposed configuration for each outlet assembly for review by the owner.
- ✦ The modular jack shall incorporate printed label strip on the dust cap module for identifying the outlet. Printed labels shall be permanent and compliant with ANSI/TIA/EIA–606-A standard specifications. Labels shall be printed using standard connectivity manufacturer’s label program or using a printer such as a Brady hand held printer. Hand printed labels shall NOT be accepted.
- ✦ Workstation Outlets shall be as specified on drawings with connector and faceplate.j
  - jacks shall:
    - Be Panduit# CJ6X88TGGR
    - Follow TIA 568B termination
  - Faceplate shall:
    - Be as manufactured by connectivity manufacturer.
    - Be UL listed and CSA certified.
    - Be available in single-gang or dual-gang.
    - Shall provide easy access for adds, moves, and changes by front removal of jack modules.
    - Possess recessed designation windows to facilitate labeling and identification.
    - Shall include a clear plastic cover to protect labels in the designation window.
    - Have mounting screws located under recessed designation windows.
    - Comply with ANSI/TIA/EIA-606-A work area labeling standard.
    - Allow for the UTP modules to be inverted in place for termination purposes.
    - Be manufactured by an ISO 9001 registered company.
    - Be compliant with the above requirements along with the following when incorporating optical fiber:
      - Be a low profile assembly,
      - Incorporate a mechanism for storage of cable and fiber slack needed for termination,
      - Position the fiber optic couplings to face downward or at a downward angle to prevent contamination.
      - Incorporate a shroud that protects the fiber optical couplings from impact damage.
      - Be stainless steel as specified on drawings and complying with requirements in section 26 05 33 “Raceways and Boxes for electrical Systems”.
      - For use with snap-in jacks accommodating any combination of UTP, optical fiber and coaxial work area cords.



- Flush mounting jacks.
- Shall have window for snap-in, clear-label covers and machine-printed paper inserts.

#### ⌵ UTP CABLE

- ✦ Subject to compliance with requirements, provide product indicated on drawing.
- ✦ Performance:
  - General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-C.1 when tested according to test procedures of this standard.
  - Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
    - ⌵ Flame-Spread Index: 25 or less.
    - ⌵ Smoke-Developed Index: 50 or less.
  - Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - Grounding: Comply with J-STD-607-A.
- ✦ Description: 100-ohm, four-pair UTP, covered with a thermoplastic jacket shall:
  - Comply with ICEA S-90-661 for mechanical properties.
  - Comply with TIA/EIA-568-C for performance specifications.
  - Comply with TIA/EIA-568-C, Category 6A for cables as specified on drawings
  - Be listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
    - ⌵ Communications, General Purpose: CMP.
    - ⌵ Communications, Plenum Rated: Type CMP, complying with NFPA 262.
  - Be plenum rated and meet applicable requirements of ANSI/ICEA S-80-576 in all locations.
  - Shall meet guaranteed Published Channel Performance – ANSI/TIA-568-C.2 Category 6A/ISO 11801 Edition 2.1 Class EA – 10G UTP
    - ⌵ Guaranteed Channel Performance – 100m
    - ⌵ The Category 6A/Class EA cabling channel solution shall be an end-to-end UTP cabling solution guaranteed to support 10GBASE-T to 100 m.
    - ⌵ The UTP channel shall exhibit superior Alien Crosstalk performance, improved Insertion Loss performance and guaranteed channel performance up to 500 MHz. The channel Alien Crosstalk performance shall be guaranteed for installed UTP channels with up to 4 connectors and up to 100 meters in length or 2 connectors and as short as 5 meters (3meter permanent link).
    - ⌵ The channel performance (including Alien Crosstalk performance) shall be guaranteed for the worst-case six-around-one channel configuration, where the entire 90m permanent link length is in a structured (combed) bundle.

- ⊘ Channel PSANEXT shall be guaranteed to be 2dB over the TIA/EIA & ISO/IEC Class EA limit from 1 to 500 MHz.
- ⊘ Channel PSAACR-F shall be guaranteed to be 10 dB over the TIA/EIA & the ISO/IEC Class EA limit from 1 to 500 MHz.
- ⊘ Channel Insertion Loss margin shall be guaranteed to be 3% over the TIA/EIA & ISO/IEC Class EA limit from 1 to 500 MHz.
- ⊘ Channel NEXT margin shall be guaranteed to be 3.5 dB over TIA/EIA & 2.5 dB over ISO/IEC Class EA limit from 1 to 500 MHz.
- ⊘ Channel PSNEXT margin shall be guaranteed to be 5.0 dB over TIA/EIA & 4.0dB over ISO/IEC Class EA limit from 1 to 500 MHz.
- ⊘ Channel PSACR-F margin shall be guaranteed to be 10.0 dB over TIA/EIA & ISO Class EA limit from 1 to 500 MHz.
- ⊘ Channel Return Loss margin shall be guaranteed to be 3.0 dB over TIA/EIA & ISO Class EA limit from 1 to 500 MHz.
- ⊘ The manufacturer shall provide Design and Installation guidelines to ensure that the minimum guaranteed performance margins are met.
- ⊘ The cable shall consist of an outer jacket, tape consisting of discontinuation metallic elements, foam barrier, and 4-twisted pairs divided by a center cross web.
- ⊘ The cable is a round design with a nominal outside diameter of 0.300 inches.
- ⊘ The cable, cordage, and connecting hardware shall be UTP components that do not include internal or external shields, or drain wires.
- ⊘ The guaranteed performance specifications for 4-connection channels shall meet the following table:

<i>Electrical Parameter</i>	<i>Guaranteed Channel Margins to ANSI/TIA-568-C.2</i>	<i>Guaranteed Channel Margins to ISO/IEC 11801 Edition 2.1</i>
Insertion Loss	3 %	3%
NEXT	3.5 dB	2.5 dB
PSNEXT	5 dB	4 dB
PSACR-F	10 dB	10 dB

⊘ UTP CABLE HARDWARE

- ✦ Subject to compliance with requirements, provide product indicated on drawing.
- ✦ General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-C.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

- ✦ Connecting Blocks: 110-style IDC for Category 6A. Provide blocks for the number of cables terminated on the block, plus 50 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- ✦ Number of Terminals per Field: One for each conductor in assigned cables.
- ✦ Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
  - 48 port patch panels that accept Category 6A modular jacks with IDC connector terminations on rear
    - ↳ The patch panel shall have electrical performance guaranteed to meet or exceed TIA/EIA 568-C.2 Category 6A and ISO/IEC 11801 Edition 2.1 Class EA component and channel specifications.
    - ↳ The panel shall be available in flat 24-port 1RU and 48-port 1RU and 2RU configurations.
    - ↳ Each modular jack in the panel shall come with universal A/B labeling and IDC termination that ensures 22 to 26 AWG cable conductors are fully terminated by utilizing a termination cap design and terminates to the modular jack through a smooth forward motion without impact on critical internal components for maximum reliability.
    - ↳ Each modular jack shall be 100% performance tested, capable of being re-terminated up to 10 times and identified with the performance level and with an individual serial number for traceability.
    - ↳ The panel shall have a black powder finish over high-strength steel.
    - ↳ The panel shall have a labeling option to comply with TIA/EIA-606-A.
    - ↳ The panel shall be equipped with a removable rear mounted cable management bar and front and rear labels.
    - ↳ The panel shall be UL listed, UL-C certified and ACA approved.
    - ↳ The panel shall support network line speeds in excess of 1 and 10 gigabit per second and be backward compatible with Category 6, 5e, 5 and 3 cords and cables.
  - 48 port patch panels with front patch cord retainer & rear cable retainer:
    - ↳ The Category 6A modular jack panels shall meet or exceed Category 6A standards requirements in ANSI/TIA-568-C.2 and Class E<sub>A</sub> in Amendment 1 to ISO/IEC 11801 Edition 2.1 shall be UL Listed.
    - ↳ The modular jack panel shall utilize universal A/B wiring.
    - ↳ The jack panels shall be 19-inch rack mountable.
  - Jacks and Jack Assemblies:
    - ↳ eight-position modular receptacle units with integral IDC-type terminals
- ✦ CATEGORY 6A REQUIREMENTS

<i>Electrical Parameter</i>	<i>Guaranteed Channel Margins to ANSI/TIA/EIA-568-C.2 (1 – 500MHz)</i>	<i>Guaranteed Channel Margins to ISO/IEC 11801 Edition 2.1</i>
Insertion Loss	3 %	3%
NEXT	3.5 dB	3 dB
PSNEXT	5 dB	4 dB
ACR-F	10 dB	10 dB
PSACR-F	10 dB	10 dB
Return Loss	3 dB	3 dB
PSANEXT	2 dB	2 dB
PSAACR-F	10 dB	10 dB

- Copper Patch Cords:

- ↘ Patch Cords shall be:

- ✦ Panduit TX6A™ 10Gig™ Patch Cords shall be constructed with Category 6A 23-AWG stranded cable featuring MaTriX Technology. Patch Cords shall be factory terminated with modular plugs featuring a one-piece, tangle-free latch design and black strain-relief boots to support easy moves, adds and changes. Panduit A™ 10Gig™ Patch Cords have incorporated MaTriX Technology and a barrier tape into the patch cable design to help suppress alien crosstalk and improve internal electrical performance. Patch cords shall be wired to be compatible with both T568A and T568B wiring schemes. The patch cords shall come in standard lengths of one to twenty feet (one-foot increments) and twenty-five to fifty feet (five-foot increments). The patch cords are available in eight standard colors of White, Blue, Yellow, Green, Black, Red, Violet, and Orange.
    - ✦ The patch cords shall be ETL verified ANSI/TIA-568-C.2 Category 6A and IEC/ISO 11801 Class EA channel performance. Each patch cord shall be 100% performance tested at the factory in a channel test to the ANSI/TIA-568-C.2 and IEC/ISO standards. The Panduit TX6A™ 10Gig™ Patch Cords must be installed as part of a complete Panduit TX6A™ 10Gig™ UTP Copper Cabling System in order to achieve 10GBASE-T certified performance.
    - ✦ Work Area Patch cords: Factory-made, four-pair, category 6A cables in 7 foot, 10 foot and 15 foot lengths; terminated with eight-position modular plug at each end.
    - ✦ Contractor shall provide one each patch cord for each Data and Voice cable terminated in a work area outlet. Patch cord shall be provided in the following lengths:
      - 60% of patch cords provided shall be 7 foot in length.
      - 30% of patch cords provided shall be 10 foot in length.
      - 10% of patch cords provided shall be 15 foot in length.
    - ✦ Cross-connect copper Patch Cords: Factory-made, four-pair, category 6A cables in 1 foot, 2 foot, or 3 foot lengths as required; terminated with eight-position modular plug at each end.

- ✦ Contractor shall provide one each patch cord for each Data and Voice cable terminated in telecom room. Cables shall be furnished in lengths as required to facilitate a neat and flexible installation. Minimum cable length shall be 1 Foot.
- ✦ Cross-connect fiber patch cords: factory made, single pair, multimode, 50/125 micrometer, OM4 and single-mode, in lengths as required, terminated with type LC, connectors as required. Verify connector type with owner prior to ordering.

#### ✦ COPPER CABLE PROTECTION UNITS

- All copper circuits shall be provided with protection between each building with an entrance cable protector panel. All building-to-building circuits shall be routed through this protector. The protector shall be connected with a #4 AWG copper bonding conductor between the protector ground lug and the structured cabling ground point. Protector modules shall be housed in connector with cover and splice chamber and shall contain punch-down blocks of same style as specified elsewhere. Enclosure shall be consistent with the environment in which it is installed.
  - ✧ Copper cable protection modules for Digital voice, Data and Security cabling shall be Circa# 4B1FS-240 or equal.
  - ✧ Copper cable protection modules for P.O.T.S, Fire Alarm System and paging cabling shall be Circa# 4B1E or equal.

#### ✦ OPTICAL FIBER CABLE

- Subject to compliance with requirements, provide product indicated on drawing.
  - ✧ Optical fiber cable characteristics
    - ✦ OSP fiber cable shall be suitable for use in both outdoor and indoor applications without the use of a transition at the building entrance.
    - ✦ Shall be suitable for use in environment where it is being installed (risers, plenums and horizontal applications).
    - ✦ OSP fiber shall be loose tube with dry water blocking elements.
    - ✦ Premise fiber shall be tight buffered.
    - ✦ Shall be available with a fiber strand count range from 6 to 288.
    - ✦ Shall have a 3.0 mm sub-unit diameter.
    - ✦ Shall have and be marked with an UL-OFNP or UL-OFNR Flame Rating as required for environment where it is installed.
    - ✦ Shall be independently verified to comply with Bellcore GR-409 and GR20
    - ✦ Shall be independently verified to comply with ICEA S-83-596 & ANSI/ICEA S-87-640
    - ✦ Strength members shall be FGE/Aramid yarn.
    - ✦ Suitable for underground or above ground conduits.

- ✦ Fibers shall be color coded in accordance with EIA/TIA 598 with an overall aqua jacket for indoor multimode cable, yellow jacket for Single mode cable and black for OSP fiber cable.
- ✦ Shall have a ripcord for overall jacket.
- ✦ Suitable for operation between -40° to +75° C
- ✦ OSP fiber cable shall be UV resistant
- ✦ Shall be constructed with dielectric yarns, dielectric central strength member or dielectric outer strength members
- ✦ Shall be protected by interlocking armor where specified
- ✦ All fiber routed in conduit or above ceiling spaces shall be protected by Maxcell, 2", 3-cell, Teflon innerduct
- ↳ Jacket:
  - ✦ Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
  - ✦ Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.
- ↳ Single mode optical fiber cable shall:
  - ✦ comply with ANSI/TIA 568-C.3, TIA 492CAAB, UL444 sunlight resistant, and listed OFNP (NFPA 262)
  - ✦ have a maximum attenuation of 0.7dB/km at 1310nm and 1550nm
  - ✦ support Gigabit Ethernet up to 10km at 1310nm and 70km at 1550nm
  - ✦ support 10G Ethernet up to 25km at 1310 and 40km at 1550km
- ✦ OPTICAL FIBER CABLE HARDWARE
  - Subject to compliance with requirements, provide product indicated on drawing.
  - Optical Fiber Cabinets/Enclosures.
    - ↳ Rack Mount Optical Fiber Enclosure shall:
      - ✦ Be equipped with either a swing out mechanism or a sliding drawer to access fibers.
      - ✦ Be capable of terminating tight-buffered or loose tube optical fiber cable.
      - ✦ Provide for bend radius control throughout the panel as well as storage space for slack cabling.
      - ✦ Meet or exceed the performance criteria per ANSI/TIA-568-C.3.
      - ✦ Be equipped with optical fiber adapter panels.
      - ✦ The optical fiber adapter panels shall accommodate either multi-mode or single-mode terminated optical fiber.
      - ✦ The optical fiber adapter panels shall be compatible with LC connectors.

- ✦ Laser optimized adapters and connectors shall be Aqua for 50/125-micrometer, OM4 cable, cable in color and equipped with zirconia ceramic sleeves.
- ✦ Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
- ✦ Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
- ↳ Patch Cords:
  - ✦ Factory-made, dual-fiber cables in various lengths as defined elsewhere in these specifications.
- ↳ Cable Connecting Hardware:
  - ✦ Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
  - ✦ Quick-connect, simplex and duplex, Type LC connectors. Insertion loss not more than 0.75 dB. Verify connector type with owner prior to ordering
  - ✦ Type SFF connectors may be used in termination racks, panels, and equipment packages if coordinated with owner prior to installation.
- ✦ PATHWAYS
  - General Requirements:
    - ↳ Comply with TIA/EIA-569-A.
    - ↳ Cable Support:
      - ✦ NRTL labeled for support of Category 6a cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
      - ✦ Support brackets with cable tie slots for fastening cable ties to brackets.
      - ✦ Lacing bars, spools, J-hooks, and D-rings.
      - ✦ Straps and other devices.
    - ↳ Cable Trays:
      - ✦ Manufacturers: Subject to compliance with requirements, provide products by one of the following:
        - Cablofil Inc.
        - Cooper B-Line, Inc.
        - WBT
      - ✦ Cable Tray Material:
        - Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inches thick.

- Where cable tray is indicated on plans, the following types shall be utilized in these specific areas:

- ↳ Basket Cable Trays (CT):

- ✦ 8 inches wide and 4 inches deep. Wire mesh spacing shall not exceed 2 by 4 inches. Tray shall be powder-coated black and shall be center hung with mounting hardware as required.
- ✦ In all telecom/MDF/IDF rooms, ladder Cable Trays: Nominally 24 inches wide, and a rung spacing of 8 inches.
- ✦ Conduit and Boxes: Comply with requirements in Section 26 05 33 “Raceways and Boxes for Electrical Systems”.
- ✦ Outlet boxes shall be no smaller than 4 inches wide, 4 inches high, and 2-1/2 inches deep.

- ✦ BACKBOARDS

- ↳ Backboards: Plywood, fire-retardant treated (both sides, two coats), 3/4 by 48 by 96 inches sheets (long side mounted vertical) to cover area indicated on drawings.

- EQUIPMENT FRAMES

- ↳ Subject to compliance with requirements, provide product indicated on drawing.

- General Frame Requirements

- ↳ Equipment racks/cabinets shall provide wire management, support, and protection for the horizontal cables inside the legs of the rack. Waterfall cable management shall be provided at the top of the rack for horizontal cables entering the rack channels for protection and to maintain proper bend radius and cable support. The rack shall include mounting brackets for cable tray ladder rack/cable runway to mount to the top of the rack. Velcro cable ties shall be provided inside the rack channels to support the horizontal cable. Rack shall be black in color to match the patch panels and cable management. Contractor shall provide complete dimensioned rack assembly details showing all components including part numbers as called for in as built drawings submittals section of this document.

- ↳ Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.

- ↳ Module Dimension: Width compatible with EIA 310-D standard, 19-inch panel mounting.

- ↳ Finish: Manufacturer's standard, baked-polyester powder coat.

- Wall-Mounted Racks shall:

- ↳ Be Black in color

- ↳ 8RU Vertical Wall Mount w/ Split door design

- ↳ Dimensions: 42 x 26 x 18 in



- ↘ Split Door Design: The split door design allows for separate access points, both lockable
  - ↘ Low-Profile: 18" depth minimizes protrusion from the wall while still maintaining 8RU worth of equipment space
  - ↘ Certified to UL2416: Load rating of up to 150 lbs (30 lbs on front door) and grounding and bonding support
  - ↘ Pivoting Patching RU Rails: Dedicated pivoting rails for patching applications (2RU and 4RU) allowing for easier terminations at rear of panel
  - ↘ Reversible Door: Door can be field-reversed and pivot from either the left or right side of the cabinet
  - ↘ Cable and Fan Knockouts: Contains knockout points for installation of fans or cable/conduit pass-through
  - ↘ 8RU FIXED RAIL KIT FOR VERTICAL WALL-MOUNT CABINET
  - ↘ 4RU PIVOTING RAIL KIT FOR VERTICAL WALL-MOUNT CABINET
  - ↘ PDU MOUNTING BRACKET FOR VERTICAL WALL-MOUNT CABINET
  - ↘ FAN KIT FOR VERTICAL WALL-MOUNT CABINET, 115 VAC
  - ↘ BACK PAN LEVER LOCK KIT FOR VERTICAL WALL-MOUNT CABINET
  - ↘ LEVER LOCK KIT FOR VERTICAL WALL-MOUNT CABINET FRONT DOOR, 36-42" SPLIT
  - ↘ CIRCULAR KNOCKOUT GROMMET KIT FOR VERTICAL WALL-MOUNT CABINET
  - ↘ TOP BRUSH GROMMET KIT FOR VERTICAL WALL-MOUNT CABINET
  - ↘ Be mounted on (2) 3/4" Plywood sheets with a minimum 1" clearance all the way around the box to the edge of the backer board.
  - ↘ Be mounted to backer board into studs/concrete block using (4) 2"x3/8" lag bolts
  - ↘ 4 110VAC power outlets in steel junction box mounted in lower left corner.
  - ↘ meet the material restrictions of Article 4 of the RoHS Directive (2011/65/EU), including Commission Delegated Directive 2015/863.
  - ↘ Be manufactured in the United States of America
- Floor-Mounted Racks shall:
  - ↘ Be modular type steel construction with grounding lug and PDU.
  - ↘ Have Baked-polyester powder coat finish.
  - ↘ Provide the necessary strain relief, bend radius and cable routing for proper installation of high performance cross connect products, meeting all specifications of ANSI/TIA/EIA-568-B.
  - ↘ Have top cable trough and built in patch/horizontal cable distribution separator.
  - ↘ Have EIA hole pattern on front and rear.



- ✦ The vertical power distribution unit shall be equipped with a minimum of ten (10) 3-prong, NEMA 5-20R, 120 VAC outlets, 10' cord.
- ✦ The vertical power distribution unit shall be equipped with surge protection with a 20 Amp current limit.
- ✦ The vertical power distribution unit shall be equipped with a bracket that enables it to be mounted on a 19" rack, cabinet or wall mount bracket without modification.
- Grounding
  - ↳ The facility shall be equipped with a Telecommunications Bonding Backbone (TBB) furnished and installed by the electrical contractor. This backbone shall be used to ground all telecommunications cable shields (where applicable), equipment, racks, cabinets, raceways, and other associated hardware that has the potential to act as a current carrying conductor.
  - ↳ Each distribution frame location (backboard location) shall be equipped with a telecommunications ground bus bar (TGB). Each TGB shall be connected to the building electrical entrance grounding facility with #3/0 AWG in 1" C. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.
  - ↳ All racks, cabinets, enclosures, cable sheaths, metallic strength members, splice cases, cable trays, sleeves, conduits, etc. entering or residing in the EF, ER, MDF or IDF shall be grounded to the respective TGB using conductors as shown on the plans or called for elsewhere in the specifications. Telecommunications grounding conductors shall be a minimum of #3/0 AWG.
  - ↳ All cable tray sections shall be connected to building ground.
  - ↳ All metallic components of fire-stop fittings and conduits shall be connected to system ground.
  - ↳ All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.
  - ↳ Comply with requirements in Section 26 05 26 "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
  - ↳ Telecommunications Main Bus Bar:
    - ✦ Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
    - ✦ Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide with 9/32-inch holes spaced 1-1/8 inches apart.
    - ✦ Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.
    - ✦ Comply with J-STD-607-A.
  - ↳ FIRE-STOP
    - ✦ Fire-stop system is comprised of the item or items penetrating the fire rated structure, the opening in the structure and the materials and assembly of the materials used to seal the penetrated structure.

Fire-stop systems comprise an effective block for fire, smoke, heat, vapor and pressurized water stream.

- ✦ All penetrations through fire-rated building structures (walls and floors) shall be sealed with an appropriate fire-stop system. This requirement applies to through penetrations (complete penetration) and membrane penetrations (through one side of a hollow fire rated structure). Any penetrating item i.e., riser slots and sleeves, cables, conduit, cable tray, and raceways, etc. shall be properly fire-stopped.
- ✦ All through penetrations shall be fire-stopped with Wire mold flame stopper (or equal) adjustable fire-stop fitting with integrated in-tumescent barrier.
- ✦ Fire-stop systems shall be UL Classified to ASTM E814 (UL 1479) and shall be approved by a qualified Professional Engineer (PE), licensed (actual or reciprocal) in the state where the work is to be performed. A drawing showing the proposed fire-stop system, stamped/embossed by the PE shall be provided to the Owner's Technical Representative prior to installing the fire-stop system(s).

#### ☒ IDENTIFICATION PRODUCTS

- ✦ Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- ✦ Comply with requirements in Section 26 05 53 "Identification for electrical Systems"

#### ☒ LABELING

- ✦ Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

#### ☒ SOURCE QUALITY CONTROL

- ✦ Testing Agency: Contractor shall engage a qualified, third party testing agency to evaluate all cables.
- ✦ Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- ✦ Factory test UTP cables according to TIA/EIA-568-B.2.
- ✦ Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.
- ✦ Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
- ✦ Cable will be considered defective if it does not pass tests and inspections.
- ✦ Prepare test and inspection reports.

### ● PART 3 – EXECUTION

#### ☒ WORK AREA OUTLETS

- ✦ Cables shall be coiled in the in-wall or surface-mount boxes if adequate space is present to house the cable coil without exceeding the manufacturer's bend radius. In hollow wall installations where box-eliminators are used, excess wire can be stored in the wall. No more than 12" of UTP and 36" of fiber slack shall be stored in an in-wall box, modular furniture raceway, or insulated walls. Excess slack shall be loosely coiled and stored in the ceiling above each drop location when there is not enough space present in the outlet box to store slack cable.

- ✦ Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B.1 document, manufacturer's recommendations and best industry practices.
- ✦ Pair untwist at the termination shall not exceed one-half inch.
- ✦ Bend radius of the horizontal cable shall not be less than 4 times the outside diameter of the cable
- ✦ The cable jacket shall be maintained to within one inch of the termination point.
- ✦ Data jacks, unless otherwise noted in drawings, shall be located in the bottom position(s) of each faceplate. Data jacks in horizontally oriented face-plates shall occupy the right-most position(s).
- ✦ Voice jacks shall occupy the top position(s) on the face-plate. Voice jacks in horizontally oriented faceplates shall occupy the left-most position(s).
- ✦ All installation shall comply with manufacturer's recommendations.

#### ☒ ENTRANCE FACILITIES

- ✦ Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.
- ✦ Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider. Coordinate with owner for the provision of any/all telecommunications utility service connections where owner request/approval is required by the serving utility. Contractor shall notify owner in writing of any/all required telecommunications utility service that requires owner coordination a minimum of five (5) weeks prior to scheduled project completion date. Contractor shall endeavor to assist owner with telecommunications utility coordination as required to expedite the provision of said utility service prior to the project completion date.

#### ☒ INSTALLATION OF EQUIPMENT ROOM FITTINGS

- ✦ Comply with NECA 1.
- ✦ Comply with BICSI TDMM for layout and installation of communications equipment rooms.
- ✦ Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
- ✦ Coordinate layout and installation of communications equipment with Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
  - Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
  - Record agreements reached in meetings and distribute them to other participants.
  - Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment as directed by owner's IT department.
  - Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and

related systems that share space in the equipment room. Contractor shall coordinate with owner's IT, Security, ETV and maintenance departments and facilitate inter-department coordination for acceptable configuration of shared space in telecom rooms.

- ✦ Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.
- ✦ Racks/cabinets shall be securely attached to the concrete floor using a minimum 3/8" hardware or as required by local codes.
- ✦ Racks/cabinets shall be placed with a minimum of 36 inch clearance from the walls or other equipment on all sides of the rack. When mounted in a row, maintain a minimum of 36 inches from the wall or equipment behind and in front of the row of racks and from the wall or equipment at each end of the row.
- ✦ All racks/cabinets shall be grounded to the telecommunications ground bus bar in accordance with other sections of this document.
- ✦ Rack mount screws not used for installing patch panels and other hardware shall be bagged and left with the rack upon completion of the installation.
- ✦ The contractor shall install 24" ladder cable tray from wall to each rack/cabinet.

#### ☒ INSTALLATION OF PATHWAYS

- ✦ Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A.
- ✦ Comply with requirements for demarcation point, pathways, cabinets, and racks specified elsewhere in this document. Drawings indicate general arrangement of pathways and fittings.
- ✦ Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- ✦ Comply with requirements in Section 26 05 33 "Raceways and Boxes for Electrical Systems" for installation of conduits and wire-ways.
- ✦ Install manufactured conduit sweeps and long-radius elbows whenever possible.
- ✦ Pathway Installation in Communications Equipment Rooms:
  - Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
  - Install cable trays to route cables if conduits cannot be located in these positions.
  - Secure conduits to backboard when entering room from overhead.
  - Extend conduits a minimum of 6 inches above finished floor.
  - Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- ✦ Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

#### ☒ WIRING METHODS

- ✦ Wiring Method: Install cables in raceways, cable trays and J-hooks except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
  - Install plenum cable in environmental air spaces, including plenum ceilings.
  - Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical systems"
- ✦ Conceal conductors and cables in accessible ceilings, walls and floor
- ✦ Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- ✦ Wiring within Enclosures:
  - Bundle, lace, and train cables within enclosures.
  - Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
  - Provide and use lacing bars and distribution spools.
  - Install conductors parallel with or at right angles to sides and back of enclosure.

#### ∟ INSTALLATION OF CABLES

- ✦ Comply with NECA 1.
- ✦ No cables shall be painted either intentionally or inadvertently. Cables must be protected during painting to avoid accidental painting or overspray. Any cable that are painted shall be replaced at no cost to the owner. Paint can degrade the cable insulation and may void the warranty.
- ✦ General Requirements for Cabling installation:
  - Comply with TIA/EIA-568-B.1.
  - Cable shall be installed in accordance with manufacturer's recommendations, best industry practices and these specifications.
  - A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.
  - Cable raceways shall not be filled greater than the ANSI/TIA/EIA-569-A maximum fill for the particular raceway type or 40% (whichever is less).
  - Comply with BICSI ITSIM "Cable Termination Practices."
  - Install Mini-Com TG Style Module termination hardware as required for copper cables unless otherwise indicated.
  - Terminate all conductors; no cable shall contain un-terminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
  - Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
  - Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.

- Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
- Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable. Any cabling found to be damaged during installation shall be removed and replaced at no cost to owner.
- Cold-Weather Installation: Bring cable to room temperature before de-reeling. Heat lamps shall not be used for heating.
- In the communications equipment room, install a 10-foot long service loop on each end of cable.
- Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
- MUTOA shall not be used as a cross-connect point.
- Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors and may only be used where specifically called for in the contract documents.
  - ✎ Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to work station equipment.
  - ✎ Locate consolidation points for UTP at least 49 feet from communications equipment room.
- Cables shall be installed in continuous lengths from origin to destination (no splices) except for transition points, or consolidation points.
- Where transition points or consolidation points are allowed, they shall be located in accessible locations and housed in an enclosure intended and suitable for the purpose.
- The cable's minimum bend radius and maximum pulling tension shall not be exceeded.
- If a J-hook or trapeze system is used to support cable bundles all horizontal cables shall be supported at a maximum of 36 inch intervals. At NO point shall cable(s) rest on acoustic ceiling grids, ceiling panels, electrical conduits, fire alarm system conduits, structural elements, mechanical piping or duct work.
- Horizontal distribution cables shall be bundled in groups of no more than 50 cables. Cable bundle quantities in excess of 50 cables may cause deformation of the bottom cables within the bundle and degrade cable performance
- Cable shall be installed above fire-sprinkler systems and shall not be attached to the system or any ancillary equipment or hardware. The cable system and support hardware shall be installed so that it does not obscure any valves, fire alarm conduit, boxes, or other control devices.
- Cables shall not be attached to ceiling grid or lighting fixture wires. Where support for horizontal cable is required, the contractor shall install appropriate carriers to support the cabling. See the plans for approximate support locations and requirements.
- Any cable damaged or exceeding recommended installation parameters during installation shall be replaced by the contractor prior to final acceptance at no cost to the Owner.



- Cables shall be identified by a self-adhesive label in accordance with the System Documentation Section of this specification and ANSI/TIA/EIA-606-A. The cable label shall be applied to the cable behind the face-plate on a section of cable that can be accessed by removing the cover plate.
- Unshielded twisted pair cable shall be installed so that there are no bends smaller than four times the cable outside diameter at any point in the run and at the termination field.
- Pulling tension on 4-pair UTP cables shall not exceed 25-lbf for a four-pair UTP cable.
- Backbone cabling
  - ↘ Backbone cables shall be installed separately from horizontal distribution cables.
  - ↘ Where cables are housed in conduits, the backbone and horizontal cables shall be installed in separate conduits.
  - ↘ Where backbone cables are installed in an air return plenum, riser rated cable shall be installed in metallic conduit.
  - ↘ Where backbone cables and distribution cables are installed in a cable tray or wire-way, backbone cables shall be installed first and bundled separately from the horizontal distribution cables.
  - ↘ All backbone cables shall be securely fastened to the sidewall of the telecom room.
  - ↘ Backbone cables spanning more than two floors shall be securely attached at the top of the cable run with a wire mesh grip and on alternating floors or as required by local codes.
  - ↘ Vertical runs of cable shall be supported to messenger strand, cable ladder, or other method to provide proper support for the weight of the cable.
  - ↘ Large bundles of cables and/or heavy cables shall be attached using metal clamps and/or metal banding to support the cables.
- UTP CABLE INSTALLATION
  - ↘ Comply with TIA/EIA-568-B.2.
  - ↘ Do not untwist UTP cables more than **1/2 inch** from the point of termination to maintain cable geometry.
- OPTICAL FIBER CABLE INSTALLATION
  - ↘ Comply with TIA/EIA-568-B.3.
  - ↘ Cable may be terminated on connecting hardware that is rack or cabinet mounted.
  - ↘ Verify termination type with owner prior to ordering.
- OPEN CABLE INSTALLATION
  - ↘ Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
  - ↘ Suspend UTP cable not in a wire-way or pathway, a minimum of **8 inches** above ceilings by cable supports not more than 36 inches apart.

- ↘ Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
- UTP CABLE HARDWARE INSTALLATION
  - ↘ Cables shall be dressed and terminated in accordance with the recommendations made in the ANSI/TIA/EIA-568-B standard, manufacturer's recommendations and best industry practices.
  - ↘ Pair untwist at the termination shall not exceed one-half inch.
  - ↘ Bend radius of the cable in the termination area shall not exceed 4 times the outside diameter of the cable.
  - ↘ Cables shall be neatly bundled and dressed to their respective panels or blocks. Each panel or block shall be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
  - ↘ The cable jacket shall be maintained as close as possible to the termination point.
    - ✦ Each cable shall be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view shall not be acceptable
- OPTICAL FIBER HARDWARE INSTALLATION
  - ↘ Adapter plates/fiber patch panels:
- SEPARATION FROM EMI SOURCES:
  - ↘ Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
  - ↘ Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
    - ✦ Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches**.
    - ✦ Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches**.
    - ✦ Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches**.
  - ↘ Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
    - ✦ Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches**.
    - ✦ Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches**.
    - ✦ Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches**.
  - ↘ Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
    - ✦ Electrical Equipment Rating Less Than 2 kVA: No requirement.

- ✦ Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches.
- ✦ Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches.
- ⊃ Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches.
- ⊃ Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches.

#### ⊃ GROUNDING

- ✦ Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- ✦ Comply with ANSI-J-STD-607-A.
- ✦ Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- ✦ Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
  - Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces. This includes the shield for coaxial cable.

#### ⊃ IDENTIFICATION

- ✦ Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems"
  - Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
- ✦ Paint and label colors for equipment identification shall comply with TIA/EIA-606-A.
- ✦ Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
- ✦ Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
- ✦ Cable and Wire Identification:
  - Label each cable within 4 inches of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
  - Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 50 feet and at every cable pathway transition.

- Label each terminal strip and screw terminal in each cabinet, rack, or panel.
- Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
- Label each unit and field within distribution racks and frames.
  - ↳ Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
  - ↳ Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606-A, for the following:
  - ↳ Cables use flexible vinyl or polyester that flexes as cables are bent.

#### ↳ FIELD QUALITY CONTROL

- ✦ Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- ✦ Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- ✦ Perform the following tests and inspections under the direction of RCDD:
  - Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
  - Visually confirm Category 5e, Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
  - Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - ↳ Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
  - Optical Fiber Cable Tests:



- ✦ Prepare test and inspection reports.
- ✦ Perform tests and inspections.
- ✦ Tests and Inspections:
  - Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
  - Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
  - Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
    - ↳ Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
  - Optical Fiber Cable Tests:
    - ↳ Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    - ↳ Link End-to-End Attenuation Tests:
      - ✦ Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, one Reference Jumper.
      - ✦ Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

- ✦ Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- ✦ Remove and replace cabling where test results indicate that they do not comply with specified requirements.
- ✦ End-to-end cabling will be considered defective if it does not pass tests and inspections.
- ✦ Prepare test and inspection reports. All testing shall be performed by equipment that has been maintained and calibrated as directed by testing equipment manufacturer. Include calibration history with test and inspection reports.

#### ↳ SLEEVE AND SLEEVE SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- ✦ Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 26 05 44 "Sleeves and Sleeve Seals for Electrical Raceway and Cabling"

#### ↳ FIRE-STOPPING

- ✦ All fire-stop systems shall be installed in accordance with the manufacturer's recommendations and shall be completely installed and available for inspection by the local inspection authorities prior to cable system acceptance
- ✦ Comply with TIA-569-B, Annex A, "Fire-stopping."
- ✦ Comply with BICSI TDMM, "Fire-stopping Systems" Article.

#### ☒ IDENTIFICATION

- ✦ Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Section 26 05 53 "Identification for Electrical Systems"
- ✦ See drawings and details for owner approved labeling method for work area outlets, cabling and MDF/IDF rooms.
- ✦ All label printing will be machine generated by connectivity/cabling manufacturer software using indelible ink ribbons or cartridges. Self-laminating labels will be used on cable jackets, appropriately sized to the OD of the cable, and placed within view at the termination point on each end. Outlet, patch panel and wiring block labels shall be installed on, or in, the space provided on the device.
- ✦ Paint and label colors for equipment identification shall comply with TIA/EIA-606-A.
- ✦ Labels shall be preprinted or computer-printed type.

#### ☒ DEMONSTRATION

- ✦ Train Owner's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

#### ☒ TESTING AND ACCEPTANCE

- ✦ All cables and termination hardware shall be 100% tested for defects in installation and to verify cabling system performance under installed conditions according to the requirements of ANSI/TIA/EIA-568-B. All pairs of each installed cable shall be verified prior to system acceptance. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% usable conductors in all cables installed.
- ✦ All cables shall be tested in accordance with this document, the ANSI/TIA/EIA standards, the connectivity/cabling manufacturer Certification Program Information Manual and best industry practice. If any of these are in conflict, the Contractor shall bring any discrepancies to the attention of the project team for clarification and resolution.
- ✦ Copper Channel Testing.
  - All twisted-pair copper cable links shall be tested for continuity, pair reversals, shorts, opens and performance as indicated below. Additional testing is required to verify Category performance. Horizontal cabling shall be tested using a Level III test unit for category 6 performance compliance as specified in ANSI/TIA/EIA-568-B.2-1.
  - Continuity – Each pair of each installed cable shall be tested using a test unit that shows opens, shorts, polarity and pair-reversals, crossed pairs and split pairs. Shielded/screened cables shall be

tested with a device that verifies shield continuity in addition to the above stated tests. The test shall be recorded as pass/fail as indicated by the test unit in accordance with the manufacturers' recommended procedures, and referenced to the appropriate cable identification number and circuit or pair number. Any faults in the wiring shall be corrected and the cable re-tested prior to final acceptance.

- Length - Each installed cable link shall be tested for installed length using a TDR type device. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568-B Standard. Cable lengths shall be recorded, referencing the cable identification number and circuit or pair number. For multi-pair cables, the shortest pair length shall be recorded as the length for the cable.
- Category 6 Performance
  - ↳ Follow the Standards requirements established in ANSI/TIA/EIA-568-B .1, B.2-1
  - ↳ A Level III test unit is required to verify category 6 performance.
  - ↳ The basic tests required are:
    - ✦ Wire Map
    - ✦ Length
    - ✦ Attenuation
    - ✦ NEXT (Near end crosstalk)
    - ✦ Return Loss
    - ✦ ELFEXT Loss
    - ✦ Propagation Delay
    - ✦ Delay skew
    - ✦ PSNEXT (Power sum near-end crosstalk loss)
    - ✦ PSELFEXT (Power sum equal level far-end crosstalk loss)

✦ Fiber Testing

- All fiber testing shall be performed on all fibers in the completed end to end system. There shall be no splices unless clearly defined in an RFP. Testing shall consist of an end to end power meter test performed per EIA/TIA-455-53A. The system loss measurements shall be provided at 850 and/or 1300 nanometers for multimode fibers and 1310 and/or 1550 nanometers for single mode fibers. These tests also include continuity checking of each fiber.
- Backbone single-mode fiber cabling shall be tested at both 1310 nm and 1550 nm (or 1310 and 1550 nm for Single mode) in both directions.
- Test set-up and performance shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, Method B.
- Where links are combined to complete a circuit between devices, the Contractor shall test each link from end to end to ensure the performance of the system. **ONLY LINK TEST IS**



REQUIRED. The contractor can optionally install patch cords to complete the circuit and then test the entire channel. The test method shall be the same used for the test described above. The values for calculating loss shall be those defined in the ANSI/TIA/EIA Standard.

- Attenuation testing shall be performed with an approved hand held tester from an industry recognized test equipment manufacturer.

#### ✦ System Documentation

- Upon completion of the installation, the telecommunications contractor shall provide three (3) full documentation sets and one (1) searchable PDF document to the Engineer for approval. Documentation shall include the items detailed in the sub-sections below.
- Documentation shall be submitted within ten (10) working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.). This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand. Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase. At the request of the Engineer, the telecommunications contractor shall provide copies of the original test results.
- The Engineer may request that a 10% random field re-test be conducted on the cable system, at no additional cost, to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the telecommunications contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

#### ✦ Test Results

- Test documentation shall be provided (in searchable PDF format) on disk within three weeks after the completion of the project. The disk shall be clearly marked on the outside front cover with the words “Project Test Documentation”, the project name, and the date of completion (month and year). The results shall include a record of test frequencies, cable type, conductor pair and cable (or outlet) I.D., measurement direction, reference setup, and crew member name(s). The test equipment name, manufacturer, model number, serial number, software version and last calibration date will also be provided at the end of the document. Unless the manufacturer specifies a more frequent calibration cycle, an annual calibration cycle is anticipated on all test equipment used for this installation. The test document shall detail the test method used and the specific settings of the equipment during the test as well as the software version being used in the field test equipment.
- The field test equipment shall meet the requirements of ANSI/TIA/EIA-568-B including applicable TSB’s and amendments. The appropriate Level III tester shall be used to verify Category 6 cabling systems.
- Printouts generated for each cable by the wire (or fiber) test instrument shall be submitted as part of the documentation package. The telecommunications contractor must furnish this information in electronic form (flash drive or CD-ROM).
- When repairs and re-tests are performed, the problem found and corrective action taken shall be noted, and both the failed and passed test data shall be documented.

#### ☒ AS-BUILT DRAWINGS

- ✦ The drawings are to include cable routes and outlet locations. Outlet locations shall be identified by their sequential number as defined elsewhere in this document. Numbering, icons, and drawing conventions used shall be consistent throughout all documentation provided. Construction documents will be modified accordingly by the telecommunications contractor to denote as-built information as defined above and returned to the Owner.
- ✦ The Contractors shall annotate the base drawings and return a hard copy (same plot size as originals) and electronic (PDF format) form.

## WARRANTY

- ✦ Supplier will honor claims on this warranty for Life (which is defined as the usable life of the building and is referred to as the “Warranty Period” and shall be no less than 30 years).
- ✦ This warranty covers the copper and fiber optic permanent links of the network (as defined by ANSI/TIA/EIA-568-C.2 for CAT 5e, CAT.6, CAT 6A, ANSI/TIA/EIA-568-C.3 for Optical Fiber Cabling and Components): which includes the cable and connecting hardware.
- ✦ This warranty will be extended to include the entire channel.
- ✦ The network cabling infrastructure must be installed in accordance with TIA 568 Series Standards, and installed by Panduit Certified installers.
- ✦ Each permanent link or channel in the network must be field tested in accordance with the TIA 568 series industry standard in force at the time of purchase AND the installed permanent links and channels must have passed all applicable TIA and manufacturer performance requirements.
- ✦ Appropriate Warranty Application form must be properly completed and submitted to Supplier prior to initiating the installation. The Warranty Submittal Form must be submitted within 10 days of installation completion.
- ✦ Copies of all certification test reports must be submitted as part of the Warranty Submittal Form, and be kept on file by the registrant to be re-submitted when requested by Supplier. Data must be saved in raw data and summary formats. Submitting the data via online upload, e-mail or on disc are the preferred methods for providing test data.
- ✦ The Campus Warranty provides that at the time of delivery, Premises Voice-Grade Cable and Outside Plant Cable products, when installed as part of a campus network along with copper and/or fiber cables from specified manufacturer for 100% of the premises LAN installation, will be free from defects in design, material, and manufacture and conform to manufacturer specifications in force at the time of purchase for a period of no less than thirty (30) years from the delivery date (the “Campus Warranty”).
- ✦ Transfer manufacturer's warranties to the owner in addition to the General System Guarantee. Submit these warranties on each item in list form with shop drawings. Detail specific parts within equipment that are subject to separate conditional warranty. Warranty proprietary equipment and systems involved in this contract during the guarantee period. Final payment shall not relieve you of these obligations.
- ✦ An Extended Product Warranty shall be provided which warrants functionality of all components used in the system for no less than thirty (30) years from the date of registration. The Extended Product Warranty shall warrant the installed horizontal and/or backbone copper, and both the horizontal and the backbone optical fiber portions of the cabling system.

- ✦ The manufacturer and contractor shall provide a warranty on the physical installation.
- ✦ All materials furnished shall meet the requirements of the connectivity/cabling manufacturer or solution providership manufacturer's as required to provide the specified warranty period.
- ✦ All materials shall be installed per the connectivity/cabling manufacturer or solution providership manufacturer's recommendations as required to provide the specified warranty period.

☒ CONTINUING MAINTENANCE

- ✦ The contractor shall furnish an hourly rate with the proposal submittal, which shall be valid for a period of one year from the date of acceptance. This rate will be used when cabling support is required to affect moves, adds, and changes to the system (MACs). MACs shall be performed by contractor that meets the qualifications outlined elsewhere in these Specifications.

☒ FINAL ACCEPTANCE AND SYSTEM CERTIFICATION

- ✦ The contractor shall furnish an hourly rate with the proposal submittal, which shall be valid for a period of one year from the date of acceptance. This rate will be used when cabling support is required to affect moves, adds, and changes to the system (MACs). MACs shall be performed by an connectivity/cabling manufacturer certified Integrator and shall be added to the warranty when registered with manufacturer. Completion of the installation, in-progress and final inspections, receipt of the test and as-built documentation and successful performance of the cabling system for a two week period will constitute acceptance of the system. Upon successful completion of the installation and subsequent inspection, the end user shall be provided with a numbered certificate, from connectivity/cabling manufacturer, registering the installation.

**END OF SECTION**