Media & Technology Services

Network Cabling
Standards & Specifications
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1. **INTRODUCTION AND BACKGROUND**

   a) **About University of Rhode Island**

   "Research, scholarship, and creative work are at the heart of the University of Rhode Island. As a land-grant public university, we were created to conduct research and then translate that research in ways that would improve the lives of the people of the state. Although our research mission has broadened considerably beyond that originally envisioned - it now encompasses numerous disciplines that could not be foreseen in the 19th century - research for the public good remains a distinctive attribute of the 21st century land-grant university.

   Our designations as a land- and sea-grant university are also reflected in the research and scholarship of our faculty, research staff, and students. The engagement of our students, at both the undergraduate and graduate levels, in research, scholarship, and creative work is of critical importance to their education. I am convinced that the best approach to preparing students for their careers is to inspire them to discover, create, and innovate. Therefore we encourage our students to become an integral part of the community of discovery that is the modern research university.

   Given the dramatic rate of change that is already so characteristic of the 21st century, the human capacity for innovation has perhaps never been more important. The University of Rhode Island has a highly innovative faculty, and they are creating new knowledge, new capacities, and new ways to teach that will serve our students, the state, the nation, and the world extremely well."

   The University of Rhode Island's main campus is located in the historic village of Kingston. The University's Alan Shawn Feinstein College of Continuing Education is located in the historic Shepard building in Providence. The Narragansett Bay Campus Graduate School of Oceanography overlooks the West Passage of Narragansett Bay. The W. Alton Jones Campus is located in West Kingston.

   b) **Sponsor**

   The Media & Technology Services-MTS Departments goal is to enhance and support the educational mission of University of Rhode Island by providing the most comprehensive and industry leading network infrastructure solutions. University of Rhode Island shall deploy cutting edge wireless and network infrastructure technologies utilizing enhanced CAT6, CAT6A and fiber optic cabling infrastructures. The robust technology infrastructures shall lay the foundation on how the University community connects, collaborates, learns and teaches into the future.

2. **OBJECTIVE**

   The objective of this document is to provide minimum standards and guidelines for the deployment of certified network infrastructure solutions. This document shall be the baseline for which Architects, Engineers and Certified Installers can design, engineer and install University's certified network
infrastructure solutions. University of Rhode Island has standardized on infrastructure technologies, manufacturers and certified installers as identified and described within.

3. **GENERAL CONDITIONS**

   a. **Proposal Costs:** University of Rhode Island is not liable for any cost incurred by the respondents in preparing responses to technology RFP’s, Quotes, BID SOLICITATION’s or negotiations associated with award of a contract.

   b. **Modifications:** University of Rhode Island reserves the right to change, modify, extend or cancel RFP’s or BID SOLICITATION’s at any time.

   c. **Permits and Fees:** The Contractor shall be responsible for obtaining and pay for all necessary permits and fees as required by the State and Local Municipalities. All permit fees and cost shall be included in all bids or cost proposals.

   d. **Review:** Contractors are required to thoroughly review the specifications and associated drawings to ensure responses are complete.

   e. **Rejection:** University of Rhode Island reserves the right to reject the Contractor proposal for incompleteness based on the requirements. University of Rhode Island also reserves the right to reject any portion of the proposal. If the Contractor fails to respond to bid opportunities as instructed it may be grounds for disqualification.

   f. **Prevailing Wages:** All Contractors are encouraged to consult with the State of Rhode Island’s Department of Labor and Training for questions or concerns regarding paying prevailing wages or visit the web site at [http://www.dlt.state.ri.us/](http://www.dlt.state.ri.us/).

   g. **OSHA:** All Contractors are encouraged to consult with the State of Rhode Island’s Department of Labor and Training for questions or concerns pertaining to OSHA-10 and OSHA-30 Safety Courses. University of Rhode Island is not liable for any cost or fines incurred by the Contractor for failure to comply with the rules and regulations as required. *(Could add this to a safety section with a confined space policy)*

   h. **Hours of Operations:** MTS normal Business hours are from 7:30 am to 4:30 pm.

   i. **Sign-In & Sign-Out Policy:** Contractors working directly for MTS IT Project Manager are required to sign in and out on a daily basis. Contractors working directly for General Contractors-GC’s shall follow policies set forth by the GC and Office of Capital Project.

   j. **Parking Instructions:** Contractors are required to park in authorized spots as identified by the University Parking Office and or as defined by the Project Manager. The University is not responsible for contractor parking tickets, towing charges or fines related to any contractor activities on campus. *(Add official parking language to the section)*

   k. **Delivery:** Deliveries of materials must be coordinated as in advance as possible. A minimum of 48 hours is required. Coordinate with Project Manager for delivery instructions.
4. **BID FORM: (Example of a bid form for internal/external projects)**

   **DATE:**

   **SUBMITTED TO:** UNIVERSITY OF RHODE ISLAND, MEDIA & TECHNOLOGY SERVICES

   **ADDRESS:** 210 FLAGG RD, KINGSTON RHODE ISLAND 02881

   **PROJECT:**

   **COMPANY NAME:**
   **SUBMITTED BY:**
   **ADDRESS:**
   **E-MAIL:**
   **PHONE:**
   **FAX:**

I. **BID**

   Having reviewed the bid solicitation, contract documents and instruction to bidders for the above mentioned project, we submit our offer to enter into contract to perform the work for the sum of:

   Base Bid $

II. **CONTRACT DURATION**

   **Substantial Completion:** The project shall be substantially completed by **XX** substantial completion includes everything but the final punch list.

   **Final Completion:** The project shall be completed **five** business days after the date of the substantial completion.

III. **LIQUIDATED DAMAGES**

   If the Contractor fails to complete the project by the final completion date the Contractor shall be imposed **$XX** per calendar day in liquidated damages. *(May add or take out as required)*

IV. **ADDENDAS**

   We acknowledge and have received the following addendums as part of the project documents.
Addendum No.1 Date: 

Addendum No.2 Date: 

V. STATE OF RHODE ISLAND LICENSE NUMBER

The Contractor under which the work shall be performed shall be licensed to do business in the State of Rhode Island as defined by the Department of Labor and Training.

Telecommunication Systems Contractors-TSC License Number: 

End Section

5. BIDDER’S QUALIFICATION FORM (Example of qualification form)

This Bidder’s Qualification Form is included as an integral part of the bid documents, for use in
evaluating the qualifications of Contractors. Failure to respond with relevant information to the stated requirements of this document may disqualify that bidder from further consideration as a bidder on this project.

The undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

DATE:

SUBMITTED TO: UNIVERSITY OF RHODE ISLAND, MEDIA & TECHNOLOGY SERVICES

ADDRESS: 210 FLAGG RD, KINGSTON RHODE ISLAND 02881

PROJECT:

| COMPANY NAME: | | | |
| SUBMITTED BY: | | | |
| ADDRESS: | | | |
| E-MAIL: | | | |
| PHONE: | | | |
| FAX: | | | |

a. TYPE OF WORK PERFORMED BY ORGANIZATION: Check all that applies

___ System Integration & Network Services
___ Structured Cabling Systems
___ Telecommunications
___ Project Management
___ Other (please specify)

b. ORGANIZATION

How many years has your organization been in business as a Contractor?

How many years has your organization been in business under its present name?

Under what other or former names has your organization operated?

Date of incorporation:
State of incorporation:

c. LICENSING

At the time of bid proposal the selected Contractor shall be licensed to do business in the State of Rhode Island. University of Rhode Island shall not accept any Contractor that is not licensed to do
business in the State of Rhode Island. The Contractor shall have a Telecommunications Systems Contractors License TCS as defined by the Department of Labor and Training. The Contractors technicians working on the jobsite shall be licensed as defined by the Department of Labor and Training.

1. **TSC Telecommunications System Contractors License:** Submit copy of the Contactors License.

2. **TST Telecommunications System Technician License:** Submit copies of the Technician Licenses.

3. **OSHA Certifications:** Submit copies of all applicable OSHA 10 or OSHA 30 Certifications.

d. EXPERIENCE

i. The Contractor shall furnish the following industry standard certifications required to staff this project. On a separate sheet, list the following **REQUIRED** company and or partner certifications:

   1. **BICSI RCDD:** Submit a copy of the RCDD certificate.

   2. **Panduit Certified Installer:** Submit corporate copies of PCI certifications.

ii. On a separate sheet, list 3 Panduit structured cabling projects your organization has completed or are in progress in the past 5 years.

   1. Name of project:
   2. Project Summary:
   3. Contact name:
   4. Contract amount:
   5. Date of completion:
   6. Percentage of the cost of the work performed with your own forces.

iii. The Contractor shall not employ any Subcontractor to fulfill any of the duties as herein specified without express, prior written approval by University of Rhode Island.

7. **EVALUATION AND SELECTION**

   University of Rhode Island shall evaluate all proposals. Respondents whose proposals have been judged acceptable by meeting the requirements as defined by the **BID SOLICIATION** will have their cost proposal considered.

8. **PAYMENT TERMS**
a. The application for payment shall be based on the schedule of values submitted by the Contractor
   and approved by the General Contractor Project Manager in accordance with the BID
   SOLICITATION.

b. The schedule of values shall be prepared in a form and supported by data to substantiate its
   accuracy.

c. The Contractor shall submit an application for payment to the General Contractor Project
   Manager on the last day of the month.

d. Actual payments shall be made based on percentage of work completed.

e. Final payment shall be made by General Contractor for the entire unpaid balance to the
   Contractor when: The Contractor has fully performed the contract as defined by the BID
   SOLICITATION and 30 days after the date of final inspection and acceptance by University of
   Rhode Island.

9. INSURANCE REQUIREMENTS (Example. Add University of Rhode Island Requirements)

The following minimum insurance standards shall apply to all suppliers performing, selling, or
   distributing products and services at University of Rhode Island. If a product or service, in the opinion
   of Insurance & Purchasing Services, represents an unusual or exceptional risk, additional insurance
   requirements for that product or service may be established.

- **Commercial General Liability Insurance:** Including Bodily Injury and Property Damage Liability,
  Independent Contractors Liability, Contractual Liability, Product Liability and Completed
  Operations Liability in an amount not less than $1,000,000 combined single limit, per occurrence,
  and $1,000,000 annual aggregate.

- **Workers Compensation:** required for all suppliers including employers’ liability insurance in an
  amount not less than $100,000 per accident, $500,000 annual aggregate.

- **Automobile Liability:** For suppliers who will drive on University of Rhode Island premises,
  Automobile Liability in an amount not less than $1,000,000 per occurrence for bodily injury and
  property damage, including owned, hired and non-owned vehicle coverage.

- **Professional Liability:** $1,000,000 each claim, for all professional services including, but not
  limited to, architects, engineers, consultants and testing services.

Suppliers shall name University of Rhode Island as additional insured on its liability policies. The
   School does not need to be named as additional insured on the supplier’s workers compensation
   policy.

If any of the required insurance policies are cancelled during the term of the agreement, supplier
   agrees to immediately purchase "like" coverage to replace the canceled policy without causing a gap
in insurance coverage. Notice must be provided to University of Rhode Island within 10 days of cancellation including the reason for cancellation and evidence that new coverage is in place that meets the requirements of this agreement.

Any liability coverage’s on a "claims made" basis should be designated as such on the certificate.

The Certificate of Insurance verifying the above coverage’s should be submitted to the XXXX. (University of Rhode Island XXXX Department, Kingston, RI 02842.)

10. INDEMNIFICATION

The successful Contractor ("Contractor") agrees to protect, defend, indemnify, save, and hold harmless University of Rhode Island, its officers, agents, servants, and employees, including volunteers, from and against any and all claims, demands, expense and liability arising out of injury or death to any person or the damage, loss or destruction of any property which may occur or in any way grow out of any act or omission of Contractor, its agents, servants, and employees, or any and all costs, expense and/or attorney fees incurred by Contractor as a result of any claim, demands, and/or causes of action except those claims, demands, and/or causes of action arising out of the negligence of University of Rhode Island, and/or its agents, representatives, and/or employees. Contractor agrees to investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit at its sole expense and agrees to bear all other costs and expenses related thereto, even if it (claims, etc.) is groundless, false or fraudulent.

11. BIDDERS’ CONFERENCE

The purpose of the Bidders Conference is to view the BID SOLICITATION and receive questions from the Contractors that intend to respond to the BID SOLICITATION. Attendance at this conference is mandatory. If the Contractor does not attend the Bidders’ Conference, then the Contractor will not be allowed to attend the Site Survey or respond to this BID SOLICITATION. The Contractor will be required to sign in to verify attendance. Subcontractors will not be allowed to represent the Contractor. An employee of the firm planning to respond must attend.

12. SITE SURVEY

Attendance at the Site Survey is mandatory. If a Contractor does not attend the Site Survey, then that Contractor will not be allowed to respond to the BID SOLICITATION.

13. QUESTIONS

The questions must reference RFP section and or subsection identifications. Responses to questions shall be sent in a formal RFI document via e-mail to all Contractors who attended the Bidders Conference and Site Survey.
14. **WARRANTY**

   a. Engineered Solutions hereinafter specified and furnished shall be fully guaranteed by the Contractor for one year (365 calendar days) against any defects.

   b. The Contractor at no additional cost to University of Rhode Island shall correct defects, which may occur as the result of faulty design or workmanship within one year after the date of acceptance by University of Rhode Island.

   c. The period of the Contractor’s warranty for any items herein are not exclusive remedies, and University of Rhode Island has recourse to any warranties of additional scope given by the Contractor to University of Rhode Island and all other remedies available at law or in equity.

   d. The Contractor’s warranties shall commence with acceptance of/or payment for the work in full.

   e. The Contractor shall submit a 25 Year Panduit Certification PLUS System Warranty on all copper and fiber permanent cabling links. The University requires that Panduit hold the Warranty with its Global Strategic Alliance Partner General Cable for the complete structured cabling copper and fiber optic systems.

   f. It is understood the Panduit Certification PLUS™ Warranty is a system performance warranty guaranteeing for 25 years from acceptance that the installed system shall support all data link protocols for which that Category of copper cabling system or fiber OM/OS designation of fiber optic system is engineered to support according to current and future IEEE and TIA standards.

   g. The Panduit Certification PLUS™ System Warranty may be invoked only if the cabling channel links are comprised of continuous Panduit & General Cable components, including patch cords, equipment cords and fiber jumpers.

15. **INSPECTION, ACCEPTANCE, AND TITLE**

   a. Inspection and Acceptance will be at the destination and upon successful project milestones unless otherwise provided. The Contractor shall coordinate all activities listed with the General Contractor who will schedule University of Rhode Island Personnel for inspections.

   b. Title to/or risk of loss or damage to all items shall be the responsibility of the Contractor until acceptance by of University of Rhode Island unless loss or damage results from negligence by University of Rhode Island.

   c. University of Rhode Island shall at all times have access to the work wherever it is in preparation or progress and the Contractor shall provide proper facilities for such access and for inspection. The Contractor shall coordinate all inspection as required.

   d. The Contractor shall not close up any work until University of Rhode Island has inspected the work. Should the Contractor close up the work prior to the inspection by University of Rhode Island.
Island, the Contractor shall uncover the work for inspection at no cost to University of Rhode Island and then recover the work accordingly to the specifications contained herein.

e. The Contractor shall notify the University of Rhode Island in writing when the work is ready for inspection. University of Rhode Island will inspect the work as expeditiously as possible after the receipt of notification from the Contractor.

16. SPECIAL CONDITIONS

a. University of Rhode Island provides students with housing, special events and an education. As such, activities on campus are critical to the provisioning of services to students, faculty, and staff and shall not be interrupted by the Contractors work activities. The installation of services associated with this work or voice, data and fiber optic systems shall not be taken off-line by the Contractor unless the URI Project Manager has made arrangements. Advance scheduling and coordinating access into building rooms needs to be considered when installing the system.

b. The Contractor will be required to work around all of the conditions listed above as well as working with the URI Project Management staff to minimize disruptions in normal campus activities.

17. PROJECT MANAGER

a. The Contractor shall provide an onsite Project Manager unless otherwise specified who shall coordinate all aspects of the project with University of Rhode Island Project Manager. The project manager shall conduct on-site weekly or bi-weekly project meetings, produce updated project schedules, coordinate all installation activities, and schedule inspections needed to successfully complete the project.

b. The University of Rhode Island shall provide a Project Manager who will act as a single point of contact for all activities regarding projects. The Project Manager will be responsible for all decisions required of University of Rhode Island and shall coordinate with all stakeholders during the installation activities. The Project Manager shall notify University of Rhode Island inspector when inspections are scheduled and shall coordinate the inspection between the Contractor and the Schools inspector.

18. BID RESPONSE

University of Rhode Island requires the contractors to submit 2 hardbound copies and an electronic copy of the proposal. The bids should be in the following format.

a. **Section 1-Executive Summary**
   Provide detailed summary pertaining to the company technology strengths and services is can provide.

b. **Section 2-Bid Form**
   Provide the completed bid form as outlined in Section 5 of the BID SOLICITATION.
c. **Section 3-Bidders Qualification Form**
   Provide a complete Bidders Qualification form as outlined in Section 6 of the BID SOLICITATION.

d. **Section 4-Copy of RFP**
   Provide a copy of the BID SOLICITATION.

e. **Section 5-Copy of Addendums**
   Provide a copy of the BID SOLICITATION addendums provided.

f. **Section 6-Copy of RFI's**
   Provide a copy of the RFI's provided.

### 19. INSTALLATION GUIDELINES

All work performed at University of Rhode Island or on projects shall be installed in accordance with latest versions of the following codes and standards.

a. Building Industry Consulting Service International (BICSI)

b. American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA), ANSI/TIA 568C

c. Telecommunications Industry Association TIA-569

d. Telecommunications Industry Association TIA-606-B Administration Standard for Telecommunications Infrastructures

e. Telecommunications Industry Association TIA-607-B Grounding & Bonding

f. Telecommunications Industry Association TIA-758-B Customer Owned Outside Plant Telecommunications Infrastructure Standard

g. National Electrical Safety Code NESC

h. National Electric Code NEC

i. National Fire Protection Agency NFPA 70

j. OSHA Regulations

k. State and Local codes and guidelines.

### 20. CABLE PATHWAYS & CLOSETS

1. Form the cables as to closely paralleled walls for support and in conduit, on Wyr-Grid, cable tray and or support hangers.

2. 1-1/4" EMT Conduits shall be the minimum size installed with a 4 square deep box and single gang plaster ring for all Category 6 and up. Proper fill ratios shall be adhered to, and additional conduits shall be required to support additional cables.

3. Designs shall maintain 40% fill ratios for all raceway systems including conduit sleeves.

4. Install 12" cable slack at the station and 10' in telecommunications rooms as required. The slack shall be neatly installed utilizing Hook & Loop wraps.
5. Install 25’ cable slack for all wireless station drop locations. *(Coordinate with Wireless Network Engineer for final determination.)*

6. Wireless drop locations shall have 1-CAT6A cable installed per access point.

7. Install 25’ service loop at each point of termination in neatly coiled bundles for all outside and inside plant fiber optic cables.

8. Install conduit pull strings as spares for all fiber optic inter and intra building cabling installs.

9. Install 75’ service loop at each manhole and or handhole for all outside plant fiber optic cables.

10. Install non corrosive nonmetallic cable supports in all manholes and handholes to support all cable slack coils.

11. Install 4” sleeves with Arlington plastic terminators with proper bend radius protection to accommodate all telecommunications cabling. The sleeves shall be sized to accommodate a 40% fill ratio. The Contractor shall install QTY 2 spare 4” sleeve per telecommunications room.

12. Install all racking and support structures according to standards in such fashion as to maintain both cited industry standards as well as manufacturer recommendations for uniform support, protection, and segregation of different cable types.

13. Contractor is responsible for maintenance of maximum pulling tensions, minimum bend radius, and approved termination methods as well as adhering to industry accepted practices of good workmanship.

14. TR & MC’s shall be sized according to EIA/TIA standards. Sizing of these spaces are critical to the provisioning of all network, communications, access control, security and emergency services. Coordinate equipment room sizes with Media & Technology Services to ensure standards are met.

15. Data Centers, MC & TR’s shall have the appropriate cooling system installed to properly dissipate the equipment heat loads. Power over Ethernet standards keep evolving with greater wattage requirements growing. Coordinate all BTU loads with the owner to determine the appropriate sized cooling system with 40% growth.

16. MC & TR’s shall have a single 20 amp convenience outlet installed on each wall within the closet. Each data rack and or cabinet shall have a dedicated 20 amp and 30 amp circuit installed unless otherwise noted. Coordinate all circuit sizing, plug types and locations with Media & Technology Services to ensure standards are met. Install dedicated sub panel in each TR or MC that is tied to emergency power to facilitate moves adds and changes within the closet. These panels shall services the space and no other circuits are allowed on the panels.

21. MANUFACTURE SUBSTITUTION POLICY
University of Rhode Island has specified Panduit & General Cable products and solutions as a no manufacture substitute. As such, substitution of the Panduit, General Cable Systems specified shall not be allowed unless otherwise noted. Contractor shall assume all costs for removal and replacement of any substituted product installed without prior written approval. Such costs shall include but not be limited to labor, materials as well as any penalties, fees or costs incurred for late completion.

22. INFRASTRUCTURE HARDWARE

The Contractor shall furnish and install all of the infrastructure hardware listed below. The installations shall include all parts and pieces of hardware not listed necessary to complete the installation per the manufactures recommendations.

a. **Wyr-Grid:** Install a Panduit 18” minimum Wyr-Grid solution part number **WG18BL10** with 4” minimum side walls part number **WGSDWL4BL** installed at 4’ intervals. The Wyr-Grid shall be installed around the perimeter of the Telecommunications Rooms and directly over the equipment racks. All cables that exit the Wyr-Grid shall have waterfalls installed. Wyr-Grid shall be installed from the floor to ceiling to support cabling between floors. The Contractor shall install all Wyr-Grid splice connectors, support brackets, intersection bend radius controls in accordance with the manufactures recommendations. The system shall be grounded and bonded as required by code and standards.

b. **Stronghold:** In suspended ceiling areas the cables shall be installed using Panduit’s Stronghold J-Pro part number example **JP2W-L20** and or J-Mod communications support hangers. The hangers shall be installed per industry standard fill ratios and utilizing Panduit hook and loop cable ties.

c. **Vertical Wire Managers:** Install Panduit part number **PRV6** & **PRD6** 6” front to back vertical wire managers. The wire managers shall be installed on the outside of each rack and row. Install Panduit part number **PRV10** & **PRD10** 10” front to back vertical wire mangers and cover between racks. Install all associated parts and accessories needed to complete the installation.

d. **Horizontal Wire Managers:** Install Panduit part number **NCM14EF4** 4U wire managers at the top and middle of each rack installed.

e. **Troughs:** Install Panduit part number **CMUT19** metal troughs at the bottom of each 4 post rack.

f. **Racks:** Install Panduit part number **R4P** four post racks and **R2P6S** two post racks.

g. **Fiber Runner:** Panduit’s Fiber Runner solutions part number example FR12X4 shall be installed within the data center environments or large IT closets where fiber Plug & Play and large volume of cross fiber patching applications are required.
h. **Cabinets:** Panduit Net-Access N-Type Network part number N8522B and S-Type Server cabinets part number S8522B shall be used within the data center or large IT closets as required. 45 RU with 800mm depth minimum requirements. Panduit cool boots shall be used to seal all entry’s into and out of the cabinets. Toolless blanking panels and shades shall be installed where required. Vertical ducting solutions and Universal Containment Solutions shall also be considered when designing or renovating a data center or large IT closet.

i. **Power Distribution Units-PDU:** Install Panduit vertical 20 amp, single phase 120V PDU part number CMRPSV20** per installed rack. Install Panduit PDU brackets part number CVPDUB as required to mount the PDU’s to racks. Actual PDU part number will be based on equipment type. APC is an acceptable alternate and the University may require metered and or switch PDU’s as part of the infrastructure design. Each Cabinet shall also include a networked and metered vertical PDU at a minimum. Coordinate power and plug type requirements with owner.

j. **UPS:** Add APC Symetra information-No Substitute

k. **Wireless Enclosures:** Enclosures shall be manufactured by Oberon Inc-No Substitute Add Information on types based on design.
23. LABELING

a. All category station cables shall be labeled 6” from the point of termination at both ends of the Category 6E & CAT6A cable installations. Panduit Self Laminating Turn-Tell wrap around labels shall be used.

b. Contractor shall, wherever possible pre-print labels using Panduit Easy-Mark software and laser jet printer.

c. The Panduit PanTher (LS8EQ) hand-held thermal transfer printer shall be used on site to print labels that were unanticipated, or that become damaged in application.

d. The labeling strategy shall, at a minimum, clearly identify all components of the system: racks, cables, panels, modules, outlets, grounding, pathways and spaces like telecommunications rooms.

e. Racks and patch panels shall be labeled to identify the location within the cable system infrastructure.

f. All labeling information shall be recorded on the as-built drawings and all test documents shall reflect the preapproved labeling scheme.

g. All label printing will be machine generated by either Panduit hand-held labeling systems, desktop labeling systems or computer generated using programs and materials built specifically for communications labeling.

h. Hand written labels will not be accepted and must be remedied at Contractors expense.

i. Cabling system labels shall utilize materials designed to outlast the cabling elements to which they attach. Office quality labels will not be accepted.

j. Panduit labels outlets, patch panels and wiring blocks labels shall be installed on, or in, the space provided on the device.

k. Panduit machine-generated labels shall be installed behind the clear lens or cover on any device that provides such an option.

l. All labels shall be permanently affixed to installed cables, patch panels, racks, cabinets, faceplates, grounding wires and busbars, and enclosures.

m. Panduit labels shall be placed in a position that insures ease or visibility. Labels shall not be altered or affixed to equipment, cable or hardware that is not intended or recommended by Panduit.

n. Backbone cabling installed in conduits the cover plates shall be labeled indicating Fiber Optic Cable Panduit part number PCV-FOCBOY and Telephone Panduit part number PCV-TELEBOY.
o. Inter-building fiber optic cables shall be labeled in each manhole and or handhole 12” entering and existing the manhole or handhole. The cables shall be clearly marked and affixed utilizing Panduit part number \textbf{M300X050Y6C}.

p. All backbone cables shall be labeled 12” from the point of entry into a termination block or patch panel utilizing Panduit part number \textbf{M300X050Y6C}.

q. All cabling added to existing “legacy” installations shall follow the labeling convention in place at that location.

r. All labeling of installed cabling in new (Greenfield) projects shall satisfy all requirements of TIA 606-B, or modified as required by the University of Rhode Island. \textbf{All final labeling schemes shall be approved by the owner prior to installation.}

24. \textbf{GROUNDING & BONDING}

The Contractor shall ground and bond all installed system components per the manufactures recommendations.

a. The Telecommunications bonding backbone shall be General Cable insulated copper #6 AWG copper ground wire or an approved equal. (\textbf{Electrical Engineer needs to design the feed to the main electrode and ground to the MC})

b. Panduit two-hole, long barrel copper compression lugs for grounding conductors shall be color coded barrel. Utilize the Panduit proper grounding crimp tool to complete the installation.

c. Telecommunications TR Grounding Busbar TGB shall be Panduit part number \textbf{GB2B0306TPI-1} with busbar label kit part number \textbf{LTYK}.

d. Telecommunications MC Grounding Busbar TMGB shall be Panduit part number \textbf{GB4B0624TPI-1} with busbar label kit part number \textbf{LTYK}

e. Wyr-Grid solution shall be grounded and bonded utilizing only approved manufactures components.

25. \textbf{FIRESTOPPING}

a. The Contractor shall firestop all penetrations to maintain the same flame rating as the structure. Firestop all conduits sleeves, tray openings as required by utilizing UL listed 3M, Hilte or and approved equal manufactures products.

b. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer’s products per specified requirements. A manufacturer’s willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
c. Interior conduit openings shall be fire stopped utilizing putties.

d. All exterior conduits shall be fire stopped. Foam sealants are not permitted.

26. COPPER CABLE & HARDWARE

a. Wireless drops shall be Panduit Category 6A, plenum rated, blue part number PUP6AM04BU-UG with Matrix Tape Technology. The Contractor may substitute the Panduit CAT6A cable with General Cable Category 6A part number 7132849 with Mosaic Crossblock. (Note: School of Nursing, Data Center, Research and Engineering Buildings drops would most likely be all CAT6A.)

b. Station drops shall be Panduit Category 6 TX6000, plenum rated, blue part number PUP6004BU-UY. The High Performance Category 6 cable shall also be installed for analog voice, emergency phone and elevator lines. The Contractor may substitute the Panduit CAT6A cable with General Cable GenSPEED 6000 Enhanced Category 6 cable part number 7131900.

c. Cables installed within the Telecommunications rooms shall be bundled utilizing the Panduit cable bundle organizing tool part number CBOT24K for optimal cabling appearance.

d. General Cable part number 2133269E category 5E copper riser cable shall be installed.

e. General Cable 6AWG green ground wire plenum rated or approved equal.

f. Panduit Mini-Com TX6A 10Gig UTP jacks shall be Red CJ6X88TGRD wireless, Blue CJ6X88TGBU data, Black CJ6X88TGBL emergency phone or elevator lines. The jacks shall be installed at the station and closet end. (Full Cat6A Installations)

g. Panduit Mini-Com TX6 Plus UTP jacks shall be Blue CJ688TGBU data, Black CJ688TGBL emergency phone or elevator lines. The jacks shall be installed at the station and closet end. (Cat6 Installations with wireless standard 6A)

h. Panduit TX6A 10gig patch cord part number example UTP6A5RD & TX6 Plus UTP patch cords part number example UTPSP6BUY shall be furnished for each wired patch panel port in the closet. The Contractor shall furnish an additional 20% spare patch cords. 50% of the patch cords shall be 5’ in length and 50% of the patch cords shall be 7’ in length part number. The standard colors are Red and Blue. Coordinate final counts, colors and spares with owner.

i. Panduit TX6A 10gig & TX6 Plus UTP patch cords shall be furnished for 100% of the wired station ends. The wireless TX6A drops shall be 1’ patch cords, the remaining station drops shall be 25% 5’cords-50% 7’ cords-25% 10’ cords. The Contractor shall furnish an additional 20% spare patch cords. The standard colors are Red and Blue. Coordinate final counts, colors and spares with owner.
j. Panduit Mini-Com Ultimate ID 48 port angled patch panel part number UICMPPA48BLY for telecommunications closet terminations. The Contractor shall provide enough patch panel ports to support 20% growth. All unused patch panel ports install Panduit black blanks part number CMBBL-X. All Wireless drops shall be on it's own Patch Panels with the same spare requirements. QTY 2 Angled transitional covers for angled patch panels shall be installed as required part number CPATCBL.

k. Panduit strain relief bars part number QTY 2-SRBWCY per 48 port patch panel.

l. Panduit Executive Series Faceplates shall be installed for all wall mount faceplates. Panduit part number CFPE2WHY example.

m. Panduit Mini-Com ultimate ID executive series white blanks part number CMBWH-X.

n. Panduit 2 port surface boxes part number UICBX2WH-A for wireless access point locations mounted about a drop ceiling.

o. Panduit Mini-Com series White faceplates, 106 frames, modular furniture outlets, floor box inserts not listed to complete the project.

p. Panduit 110 Blocks with C-5 clips for all copper risers

q. Panduit part number CPPA24FMWBLY 24 port panel for copper risers to be rack mount. Panduit CAT5E Black jacks part number CJ5E88TGBL in all 24 ports for single pair riser terminations. Panduit part number SRB19BLY extended strain relief bars shall be installed per 24 port panel. Coordinate final terminations with University of Rhode Island to ensure accuracy and scope.

r. Panduit Quicknet copper assemblies and hardware shall be installed for all Plug & Play designs.

27. FIBER CABLE & HARDWARE

The riser and outside plant fiber optic distribution cabling and hardware shall be Panduit.

a. Panduit 12 fiber OM3 part number FOPPX12Y & 12 fiber SM part number FSPP912Y CMP cable shall be interlocking armored and installed between the MC and TR's. Intra-Building Applications. (Add Minimum fiber counts for cable risers)

b. Panduit 12 fiber Gel-Free OM3 part number FOWNX12 armored outdoor rated for Inter-Building Applications. (Add minimum count for outside plant cables)

c. Panduit 12 fiber Gel-Free SM part number FSWN912 armored outdoor rated for Inter-Building Applications. (Add minimum count for outside plant cables)
d. Panduit 6F part number FO6CB & 12F part number FO12CB breakout kits shall be used when terminating outdoor loose tube cables.

e. Panduit 1U rack mount fiber optic panel part number FCE1U shall be installed for riser fiber applications. FCE1U panels shall be installed on each end of the fiber run from the MC to the TR.

f. Panduit FCE2U+ fiber optic patch panels shall be installed for termination of 48+ fiber counts.

g. Panduit wall mount fiber panels shall be used when applicable. Panels shall come with latched covers.

h. Panduit 10gig OM3 with 6 duplex LC adapters part number FAP6WAQDLCl shall be installed or as required based on fiber counts.

i. Panduit SM with 6 duplex LC adapters part number FAP6WBUDLCZ shall be installed or as required based on fiber counts.

j. Panduit blank fiber plates part number FAPB shall be installed for all unused 6 pack ports.

k. Panduit OM3/OM4 Cam pre-polished LC connectors part number FLCSMCXAQY shall be installed for all Multi-Mode riser distribution terminations. Connectors shall carry a minimum of -55db back reflection.

l. Panduit SM Cam pre-polished LC connectors part number FLCSSCBURY shall be installed for all Single Mode riser terminations.

m. Panduit 3 meter LC to LC duplex OM3/OM4 patch cords part number FXE10-10M3 shall be furnish as part of fiber optic projects. Coordinate QTY’s and sizes with owner. Patch cords shall be provided for a minimum of 50% of the terminated ports.

n. Panduit 3 meter SM LC to LC duplex patch cords part number F9E10-10M3Y shall be furnished as part of the fiber optic projects. Coordinate QTY’s and sizes with owner. Patch cords shall be provided for a minimum of 50% of the terminated ports.

o. Panduit OM3 Quicknet Fiber Optic Plug & Play fiber assemblies shall be installed Data Center applications. Panduit PanMPO shall be the standard trunking connector. Fiber Optic patch cords shall also be provided for a minimum of 50% of the terminated ports to complete the end to end solutions. Coordinate all solutions with owner.

28. SUBMITTALS

a. Submit manufacturer PDF cut sheets and highlight the part numbers for the products specified for this project. The Contractor shall submit only specified or accepted manufactures in the submittal sheet.

b. Make sure the submittals are clearly marked, indicating what the product or material is intended
to be used for and reference specification section numbers.

c. University of Rhode Island Media & Technology Services shall review all project submittals for acceptance.

29. TESTING

All copper pairs or optical fibers of each installed cable shall be tested and verified prior to system acceptance. Any defect in the cabling system performance or installation including but not limited to cable, jacks, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors or fibers in all cables installed. All cables shall be tested in accordance with this document, the ANSI/TIA Standards, the PANDUIT® ™ System Warranty guidelines and best industry practice. University of Rhode Island shall at all times have access to testing while it’s being performed by the Contractor.

I. Copper Link Testing

a. Category 5E, 6 and 6A twisted-pair copper cable links shall be tested for compliance to the requirements in ANSI/TIA 1152 and ANSI/TIA 568-C.2 for the appropriate Category of cabling installed using a test unit meeting a minimum IEC III level of accuracy.

b. All testers used must have been factory calibrated by the manufacturer within one year of use or according to factory calibration recommendations, whichever is the more stringent.

c. Contractor shall set references according to manufacturer’s recommendation prior to each day’s testing and reset references anytime tester is left unused for more than two hours.

d. For Panduit warranty purposes, Contractor shall perform the appropriate Permanent Link test. Channel Link testing is rendered void by the movement of patch cords and can be run but not used for final acceptance criteria.

II. Fiber Testing

a. All installed fiber shall be tested for link-loss in accordance with ANSI/TIA-C.0 and shall be within limits specified within ANSI/TIA-C.3, or as spelled out in the project documentation.

b. For horizontal cabling system using multimode OM3 optical fiber, attenuation shall be measured in one direction at either 850 nanometer (nm) or 1300 nm using an LED light source and power meter.

c. Attenuation testing shall be performed with a stable launch condition using two-meter jumpers to attach the test equipment to the cable plant. The light source shall be left in place after calibration and the power meter moved to the far end to take measurements.

d. Test set-up and performance shall be conducted in accordance with ANSI/568-C.0 standard, Method B.

e. 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 basic link-loss testing with a power meter is required.

f. The values for calculating loss shall be those defined in the ANSI/TIA 568-C.3 Standard. If the link loss requirements defined within the standard are in conflict with those referenced in the project documentation, Contractor shall immediately bring this to the attention of Information Technologies for resolution.

g. Outside Plant single-mode fiber cabling shall be OTDR tested at the 1310 and 1550 wavelengths in both directions. Multi-Mode OM3 shall be OTDR tested at 850nm and 1300nm. Minimum 1000’ launch cords shall be used to ensure two point testing is completed. All test traces shall be saved submitted in PDF format. Any connectors found to be out of spec for .db loss shall be replaced.

30. AS-BUILTS

a) Upon completion of the installation, the Contractor shall provide three (3) full documentation sets to University of Rhode Island for approval. Documentation shall include the items detailed in the sub-sections below.

b) Documentation shall be submitted within ten (10) working days of the completion of each testing phase. This is inclusive of all test results and draft as-built drawings. Draft drawings may include annotations done by hand. Final copies of all drawings shall be submitted the latest version of AutoCAD and PDF Format. The final test reports shall be submitted in PDF format within 30 working days of the completion of each testing phase.

c) The Contractor shall submit as-built drawings indicating all drop locations ID’s and cable pathways installed on this project. The as-built diagrams shall also include what drops are installed to each telecommunications room. This is both to give the University of Rhode Island an idea of the cable plant design, as well as to facilitate future troubleshooting.

d) At the request of the Technology Manager, the telecommunications Contractor shall provide PDF copies of the original test results in tester native format, not spreadsheet.

e) University of Rhode Island 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 Contractor, additional testing can be requested to the extent determined necessary by University of Rhode Island, including but not limited to a 100% re-test. This re-test shall be at no additional cost to University of Rhode Island.

End Section
31. **SCOPE OF WORK Examples**

The scope of work includes, but is not limited to, providing the following labor, materials and equipment necessary to complete the structured cabling system described within. The Contractor shall install, terminate, test, label, ground and bond all fiber optic and copper cabling systems per the manufactures recommendations. The Contractor shall verify all part numbers provided, cable flame ratings and remedy all discrepancies.

Examples

a) From Building X MC install Panduit 1-48 SM 9/125um armored outdoor rated fiber optic cable to the Building Y main networking room MC.

b) Install Panduit 1-12MM OM3 fiber cable, 1-12SM fiber cable, 1-25 pair General Cable CAT5E copper, 1-6AWG ground wire from Building Y MC to each TR.