1.0 GENERAL

1.0. A. Northern Kentucky University follows all current ANSI/TIA/EIA 568, 569, 570, 607 and 758 standards, National Electrical Code, National Electrical Safety Code, and all local jurisdiction codes.

1.1 STANDARDS

1.1. A. Building structured cabling systems shall meet Northern Kentucky University’s (NKU) Office of Information Technology cabling conventions to include adherence to the most currently available BICSI Building Industry Consulting Service International TDM Telecommunications Distribution Methods Manual, TIA/EIA Telecommunications Building cabling Standards, NFPA National Electrical Code manuals (ANSI/TIA/EIA) and also meet a minimum of 25 year warranty standards of the manufacturer. This includes addendums to TIA standards such as 568-B.2 addendums 1, 2, 3, and 4. Contractors shall be fully acquainted with the above referenced standards and be fully qualified, as outlined in the NKU Technology Infrastructure contractor qualifications. Contractors shall have demonstrated qualifications to install and test a 10-Gigabit intra/inter-building backbone. All station and riser cabling shall be tested and certified by the contractor to support 10-Gigabit technology. Additionally, the contractor will be required to meet NKU conventions and standards. The following specified Technology Infrastructure Cabling Standards are to be used as a minimum required guide.

1.2 COMMUNICATION CABLEING SYSTEM CONTRACTOR QUALIFICATIONS

1.2. A. The NKU Office of Information Technology requires that only qualified and experienced communication cabling system contractors perform project management and installation services in the construction or remodel of University buildings. Pursuant to this, NKU’s Office of Information Technology wants to ensure that successful contractors have the capabilities, qualifications, financial stability, resources, equipment, and experience to complete communication cabling system installations using common industry practices (i.e. Current BICSI TDM, ANSI/TIA/EIA 568, 569, 570, 607 and 758 standards, National Electrical Code, National Electrical Safety Code, and all local jurisdiction codes, etc.), while meeting all NKU Office of Information Technology guidelines.

1.2. B. Contractor (prime and any sub-contractors) must meet the requirement of having continuously performed communication cabling system installation work for a period of at least the past five years. Contractor must provide manufacturer technician certification information, customer references, and documentation
supporting this requirement. Contractor shall provide at least 2 references from similar installations, one within the last 6 months and one from at least 2 years ago.

1.2. C. Communication cabling system contractor, at all times during performance and until work is completed and accepted, shall have on the premises a competent supervisor, satisfactory to NKU’s Office of Information Technology and with authority to act for the communication cabling system contractor regarding work schedules and any changes to the scope of work. The supervisor must be a BICSI certified Technician and a BICSI member in good standing.

1.2. D. Contractor and their installers must be a local, Legrand/Ortronics-certified integrator/installer, able to obtain a minimum 25 year warranty.

1.2. E. Communication cabling system contractor must have a current BICSI certified RCDD (Registered Communication Distribution Designer) on staff as a full-time employee. A copy of the RCDD certificate and BICSI member number must be provided with bid documents.

1.2. F. Communication cabling system contractor must provide at least one project manager or lead technician on a project who is a BICSI certified Technician and a BICSI member in good standing. A copy of their certificate and BICSI member number must be provided with bid documents.

1.2. G. Communication cabling system contractor must be skilled and proficient in both inside cable plant (copper and fiber) design, installation, as well as outside cable plant (copper and fiber) design, installation, termination, splicing, and testing. Communication cabling system contractor must provide a list of equipment owned (i.e. fusion splicer, OTDR, excavation equipment, cable testers, etc.).

1.3 PROGRESS MEETINGS

1.3. A. The contractor will be required to meet with and coordinate with a representative of the NKU Office of Information Technology prior to work beginning and weekly during the installation process. Weekly meetings will include a site inspection to ensure compliance with established standards. The successful electrical and communication cabling system contractor will follow appropriate installation guidelines, as contained in the most currently available BICSI TDM, ANSI/TIA/EIA Wiring Standards, and NFPA National Electrical Code manuals. Additionally, contractor will work with NKU’s Office of Information Technology to ensure proper placement, routing, labeling, and documentation of cable and support hardware.

1.4 DOCUMENTATION

1.4. A. Prior to system acceptance, the contractor shall submit to the owner fully documented and scaled drawings of the entire fiber optic and copper distribution system. Documentation shall be provided in both a hard copy binder and an electronic copy on a USB drive capable of being viewed and edited in
Visio Professional. This will include building and floor layouts with workstation information outlet locations and labeling, MDF (Main Distribution Frame room), IDF (Intermediate Distribution Frame room), cable routes, interconnect locations, intermediate and main distribution frame locations, riser locations, and all other information pertinent to the installation.

1.4. B.
The contractor will be responsible for accurately labeling and identifying all relevant components of the cabling system, including, but not limited to: Workstation outlet faceplate labeling; workstation cable labeling; patch panel and port labeling; Telecom block labeling; Riser cable labeling; backbone cable labeling at entrance to MDF or IDF; fiber optic patch panel labeling and strand labeling. The contractor will consult with NKU’s Office of Information Technology representative in regards to labeling and identification. The labeling nomenclature is as follows:

All Voice and data cabling for the university will follow one simple labeling plan: room # - Outlet# - Jack #. Data, voice ports will be distinguished in the second Integer where data ports will use a number, voice ports will use a letter, (A, B, C).

Other list of possible extensions to be included:

- Security Camera = C
- Crestron Panel = CR
- Elevator = E
- Fire Panel = F
- Projector = P
- Wireless Access = W

EXAMPLE: 208-1-1 =’s room #208, data outlet # 1, jack # 1
EXAMPLE: 549-A-1 =’s room #549, voice outlet # A, jack # 1
EXAMPLE: 128-3-3 =’s room #128, data outlet # 3 and jack # 3 in that room
EXAMPLE: 745-C-3 =’s room #745, voice outlet # C and jack # 3 in that room
EXAMPLE: 609-P-1 =’s room #609, projector outlet # 1 and jack #1 for projector
EXAMPLE: 332-W-1 =’s room #332, wireless access outlet # 1 and jack #1 for wireless access point

The jack colors on workstation side shall be Blue.

Outlets will be numbered from the primary entrance into a room in a clockwise fashion, left to right. Numbering the wall outlets first, floor outlets second and the ceiling outlets last.

This simple nomenclature denotes three integers for all voice and data labeling where, the first integer is the room number, the second integer is either
voice, data or projector outlet or other (denoted by a number or letter) in the room and the third integer is the jack # in the outlet.

Northern Kentucky University also requires that each individual cable be labeled at both ends with the same numbering plan explained above, per BICSI standards. All labels must be machine printed and permanent.

Contractor should consult with NKU for proper labeling standards prior to installation.

1.4. C
The contractor will be responsible to affix cable tags on all cables that are installed through the NKU manhole, hand-hole and Arial pole systems. These cable tags will be affixed to each cable in each manhole and clearly state the:
To & from locations, pair counts, strand count, cable type and use.

Examples:
BC > SU -12ST-SM-D = BC building to Student Union, 12 strand, single mode, data.
SC > LA -400PR-CP-V = Science Center to Landrum, 400 pair, Copper, Voice.

1.5 MATERIALS LIST

Items cannot be substituted. Contractors should present quotes based on the material list provided by NKU.

1.5. A.
Workstation Outlet - New work:
NKU prefers to utilize modular faceplates that allow for a variety of modules such as fiber, copper, USB, and audio/visual connections in both flat and angled configurations.

Ortronics Single Gang Series II Angled Wall Plate, (holds 4 jacks) Fog White. Ortronics PN: OR-40300158 plus (2) OR-40300656

RJ45 Jack, 10 Gigabit, RJ45, T568A/B, Snap-In Module, Blue. Ortronics PN OR-TJ6A-36 used for data outlets

Blank Module, Fog White. Track Jack Blank: PN OR-42100002; Series II Blank: PN OR-40300023

Please consult NKU IT for non-faceplate installation (furniture or surface mount box)

In areas where fiber to the desktop will be deployed:

Fiber Optic Workstation Module, Single Mode, Duplex, LC. Ortronics PN OR-63700076

1.5. A.1.
Patch Cordage – Copper – Color is BLACK for 6A:
Maximum length of Cat6a patch cords is 7 feet. As such, design and implementations shall consider same by ensuring outlet locations are no more than 7 ft. from devices to be network connected.
Ortronics Cat6A Black Patch Cord, PN: OR-MC6A03-00 (3 foot); PN OR-MC6A05-00 (5 foot); PN: OR-MC6A07-00 (7 foot)

**Patch Cordage - Fiber:**

Single Mode: Utilized in backbone & workstation applications

All Fiber jumpers will be SM LC to LC either one or two meter in length
Single mode Fiber Optic Jumpers LC-LC Ortronics PN: OR-P1DC2IRSZSZ002M (2 meter); Ortronics PN: OR-P1DC2IRSZSZ003 (3 meter)

1.5. B.
**Station Cable- (Horizontal):**

Augmented Category 6, 4 twisted pair, 23 AWG, non-continuous metallic tape, CMP Plenum, Blue Station Wire for Data. General Cable PN: 7132849

Fiber to the desk cable, 6 strand armored plenum indoor single mode with Corning Glass. Corning PN: 006E88-31131-A3 or GCC or SPSX equivalent with Corning Glass.

1.5. C.
**Riser Cable:**

Category 3 copper cable, 25 twisted pair, 24 AWG, PVC, CMR non-plenum Riser Cable. General Cable PN: 2133033
Category 3 copper cable, 25 twisted pair, 24 AWG, CMP Plenum Cable. Cable PN: 2131505

Indoor only fiber optic installations will utilize plenum-rated single mode 12 strand premise distribution cable Corning PN: 012E88-33131-29 (or GCC or SPSX equivalent with Corning glass)

Outdoor or indoor/outdoor fiber optic installations will utilize plenum-rated single mode 12 strand armored indoor/outdoor plenum-rated cable Corning PN: 012E8P-31131-A3 (or GCC or SPSX equivalent with Corning glass)

Fiber optic cable construction, glass type and manufacturer shall remain constant through any variation of fiber optic strand count.

1.5. D.
**MDF/IDF Data station cable termination and equipment:**

By default, all data cabling media shall be terminated in Ortronics MM20 equipment racks with adequately sized cable management. Minimum 10” vertical wire management is required between racks and 6” vertical wire management on the ends. The goal is to not exceed a 40% fill rate at installation. The contractor should review all racks and bring any that will exceed this rate to the attention of the University project manager.

NKU prefers to utilize modular “jack” panels. The modular “jack” panels shall be angled to eliminate the need for multiple horizontal cable managers and shall support up to 24 ports in 1RU. Each patch panel port shall be 100% tested
to ensure NEXT and RL performance. A single 4U horizontal manager shall be used in each rack as a channel for cords to go from one side of the rack to the other.

Unloaded Patch Panel, Angled, 24-port, Ortronics PN: OR-PHAPJU24
Black Panel Jacks, Category 6A for unloaded panels, Ortronics PN: OR-PJ6A-00

2 post rack; MM20, 7ft, 19” mounting, 30” channel depth for horizontal cable mgt. Ortronics PN: OR-MM20730-B; Used in IDFs

Adjustable 4 post rack MM20, 7ft, 19” mounting, Ortronics PN: OR-MM2042ADJ12-B; used in MDFs

Wire Management as specified in section 1.5.H.

1.5. E.
MDF/IDF Voice station cable & Voice riser cable termination and equipment:

By default, all voice cabling media shall be terminated on wall mounted backboards.
Category 6 96-pair 110 IDC type punch down blocks with mounting legs. Ortronics PN: OR-110ABC6100

Ortronics MM20 7ft Cable Management Rack w/ 6 in deep channels, PN: OR-MM20706-B
Ortronics Mighty Mo Wall-Mount Cable Management Cabinet, 19U x 24w x 26D PN OR-MMW192426P-B
Ortronics Wall-Mount Relay Rack, PN: OR-604045450

1.5. F.
MDF/IDF, Fiber Optic entrance cable, Copper entrance cable termination and equipment:

Indoor only fiber optic installations will utilize plenum-rated armored single mode 12 strand premise distribution cable Corning PN: 012E88-33131-A3 (or GCC or SPSX equivalent with Corning glass)

Outdoor or indoor/outdoor fiber optic installations will utilize plenum-rated single mode 12 strand armored indoor/outdoor plenum-rated cable Corning PN: 012E8P-31131-A3 (or GCC or SPSX equivalent with Corning glass)

Fiber optic cable construction, glass type, and manufacturer shall remain constant through any variation of fiber optic strand count.

Fiber Distribution Center termination cabinet, 4 rack units with capacity of 12 adapter panels (Ortronics PN: OR-FC04U-C)
Fiber Distribution Center termination cabinet, 2 rack units with capacity of 6 adapter panels (Ortronics PN: OR-FC02U-C)
Fiber Distribution Center termination cabinet, 1 rack unit with capacity of 3 adapter panels (Ortronics PN: OR-FC01U-C)
Single mode LC connector 12 strand (6 duplex) pre-loaded panel (Ortronics PN: OR-OFP-LCD12AC)
Single mode Fiber Connectors shall be LC:

LC individual splice on connector (6 Pack) - Ortronics PN: OR-205KNP9SA-09
Fan out Kit (6 fiber) - Ortronics PN: OR-61500858
Fan out Kit (12 fiber) - Ortronics PN: OR-61500868

Circa BET Building Entrance terminal - (110 type) 100 pair increments. Circa PN: 1880ECA1-100.

1.5. G.
Grounding and Bonding:

All grounding must be on an independent, standalone system ground.

Telecommunications Main Grounding Busbars (TMGB) Ortronics PN: OR-GB4X12TMGB
Telecommunications Grounding Busbars (TGB) Ortronics PN: OR-GB2X12TGB

1.5. H.
Wire management:

For use with Ortronics 2 and 4 post MM20 racks.

For end racks, Vertical Cable Management 84”H x 6”W x 8”D w/Door. Ortronics PN: OR-MM20VMD706-B
For adjoining racks, Vertical Cable Management 84”H x 10”W x 13”D w/Door. Ortronics PN: OR-MM20VMD710-B
For MM Horizontal mgmt., a single 4U horizontal manager shall be used as a channel to pass patch cords from one side of the rack to the other. Ortronics PN: OR-MM6HMF4RU

1.5. J.
Firestopping:

EZ Path Fire rated cable pathway devices shall be used in fire-rated construction for ALL low-voltage, video, data and voice cabling, optical fiber raceways and certain high-voltage cabling where frequent cable moves, adds and changes may occur. Pathways required for high voltage cabling will be detailed on the prints. Such devices shall:

Meet the hourly fire-rating of fire rated wall and or floor penetrated.

Be tested for the surrounding construction and cable types involved.

Have UL Systems permitting cable loads from; “Zero to 100% Visual Fill.” This requirement eliminates need for fill-ratio calculations to be made by cable technicians to ensure cable load is within maximum allowed by UL System.

Not have inner fabric liner that tightens around and compresses cables tightly together encouraging potential cable damage or interference.

Be “Zero-Maintenance”, zero-maintenance is defined as; No action required by cabling technician to open and/or close pathway for cable moves, adds or changes, such as, but not limited to: opening or closing of doors; spinning rings to open or close fabric liner; removal and or replacement of any material such as, but not limited to, firestop caulk, putty, pillows, bags, foam muffins, foam, foam plugs, foam blocks, or foam closures of any sort.

Pathways shall be engineered such that two or more devices may be ganged together for larger cable capacities.
Pathways shall be engineered to be re-enterable so they can be retrofitted and removed from around existing cables without cutting and re-splicing them.

Affix adhesive wall label immediately adjacent to devices to communicate to future cable technicians, authorities having jurisdiction and others the manufacturer of the device and the corresponding UL System number installed.

Cable tray shall terminate at each barrier (wall) and resume on the other side such that cables pass independently through devices. Cable tray shall be properly supported on each side of the barrier (wall). Cable tray shall NOT pass through the barrier (wall).

Substituted material is not allowed.

Acceptable Products from STI:

<table>
<thead>
<tr>
<th>Part Number / Series</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>EZD22</td>
<td>2” EZ Path Firestop Device</td>
</tr>
<tr>
<td>EZD33FWS</td>
<td>3” EZ Path Firestop Device</td>
</tr>
<tr>
<td>EZDP133CWK</td>
<td>3” EZ Path Firestop Device Kit (for 4” conduit)</td>
</tr>
<tr>
<td>EZDP33FWS</td>
<td>3” EZ Path Firestop Device Kit (square mount)</td>
</tr>
<tr>
<td>E2P333W</td>
<td>3” Ganging Accessory (Qty 4) for 3” EZ Paths</td>
</tr>
<tr>
<td>EZD44S</td>
<td>6” EZ Path Firestop Device</td>
</tr>
<tr>
<td>EZDP44S</td>
<td>6” EZ Path Firestop Device Kit (square or round mount)</td>
</tr>
<tr>
<td>E2P544W</td>
<td>Ganging Accessory (Qtal-5) for 6” EZ Paths</td>
</tr>
<tr>
<td>EZGxxxxx</td>
<td>Grid for riser applications</td>
</tr>
<tr>
<td>RFG2</td>
<td>Individual Cable EZ firestop grommet (10 pack)</td>
</tr>
</tbody>
</table>

1.5. H
Pathways and Penetrations:

Cable Trays

Standard for basket tray is Cablofil.

All cable trays shall be designed to accommodate all types of cabling. Note that installation shall be in non-return air plenum space only. All telecommunications pathways (Caddy J-hooks, basket tray or Legrand/Wiremold raceways) shall be used for communications medium (voice, data and fiber optic cabling) only.

The minimum dimensions for a cable tray shall be 12 inches wide and 4 inches deep. The tray must consist of continuous, rigid, welded steel or stainless steel wire mesh cable management system. The cable tray systems are defined to include, but are not limited to, straight sections, supports and accessories. Wire mesh cable tray will have continuous Safe-T-Edge T-welded top side wire to protect cable insulation and installers. Basket tray shall be spliced using EDRNs on the sides as well as an SWK washer/nut in the bottom of the tray.

Contract documents shall show cross section of the communication wire way or cable tray. The drawing must show reference to other utilities in the building. All sections of the cable tray must be bonded together with approved
bonding methods and devices. For installation of other types of “approved” low voltage cables in the cable tray, a separate tray or at minimum a divider in the basket tray to prevent interference from unshielded cables is required.

Supports for cable trays larger than 12 inches in width are to be installed according to the manufacturer specifications. A single support is not acceptable. All supports are to be fastened to the building structure above. If the cable tray will be of a wall mount type, it must be installed properly to provide proper permanent support at trays maximum capacity.

Radius Drop outs shall be used whenever multiple cables are exiting the tray.

STI’s EZ Path’s (44, 33 or 22 series) shall be used in conjunction with the tray whenever cabling is going through a fire rated wall.

Cable trays must maintain a minimum of 6-inch clearance from obstructions above the tray and a minimum of 8 feet AFF. Trays are to provide access via the most direct path to all communications outlets on the floor.

Install sweeping factory 90’s for all turns. Use end-of tray terminations where wire drops down to walls to prevent abrasions and cuts from metal tray edges. Use a trapeze supported cable tray mounting method suspended by manufacturer recommended size all-thread. Fasten all-thread to ceiling anchors, allowing no bends in all-thread. Support the cable tray in this manner at every section-to-section junction and at 5 feet to 6 feet intervals (mid span) between joints. Whenever possible, the tray should be no closer than 6 inches from the structural ceiling, ducts or pipes, considering all other possible obstructions. A minimum of 5 inches distance from lighting, especially fluorescent lighting, is desired.

Coordinate layout and installation of cable tray with other trades. Revise locations and elevations from those indicated as required to suit field conditions and as approved by the Architect. Basket tray installation in the TRs shall be installed as depicted on the drawings by the Telecommunications Contractor. The basket tray that is to be installed for the horizontal and backbone distribution will be provided and installed by the electrical contractor.

Storage and Handling: Avoid breakage, denting and scoring finishes. Damaged products will not be installed. Store cable trays and accessories in original cartons and in clean dry space; protect from weather and construction traffic. Wet materials will be unpacked and dried before storage.

Refer to the drawings for the size and location of the tray to be installed.

Ground cable trays at end of continuous run. Ground continuous cable tray runs every 60 feet. Cable trays that are not UL Classified will be grounded per NEC requirements and manufacturer recommendations.

Ground cable trays against fault current, noise, lightning, and electromagnetic interference by mounting grounding wire to each 10’ cable tray section with grounding clamp.

Open Top Cable Supports (J-hooks)

Standard is Erico/Caddy HP series of j-hook
All open top cable supports (J-hooks) must be suspended from or attached to the structural ceiling or walls with hardware or other installation aids from Caddy specifically designed to support their weight. When used, Caddy J hooks shall be located on 48 to 60 inch centers to adequately support and distribute the cables weight. These types of supports may typically hold up to fifty 0.25-inch diameter cables.

No other cables shall be run in the same j-hooks along with the voice and data cables. A separate painted (white, red, blue, green) Caddy j-hook system must be provided to facilitate the installation of other low voltage cabling. For larger quantities of cables that convene at the Telecommunications Closet, provide Cablofil cable trays or other special ERICO/CADDY supports that are specifically designed to support the required cable weight and volume. No plastic j-hooks will be allowed.

**Floor Mounted Assemblies (Floor Boxes and Poke-Thru Devices)**

All Floor Mounted Assemblies including floor boxes, poke thru devices, floor outlets, floor mounted whips, tombstones, etc. shall be sized using industry standard guidelines for telecommunications distribution methods; specifically relating to cable fill ratios and limitations. Guidelines can be found in the Building Industry Consulting Service International (BICSI) Telecommunications Distribution Methods Manual and/or through individual cabling manufacturers’ installation guidelines.

Standard for all Poke-thru devices and floor boxes is the Evolution series from Legrand/Wiremold.

**Floor boxes:**

Specifically, be of the “Evolution” series from Wiremold be used in concrete, raised floor and wood floor applications and are fully adjustable both pre and post concrete pour, have removable dividers and a tunnel feature that allows all compartments to be connected, have removable modules through the top or back of the floor box. The floor box hinge must be able to open to a full 180 degrees and lie flat on the floor surface providing easy access to interior modules. Cable egress doors lock in position when open and will automatically close around wires to protect cabling and avoid tripping hazards. They accept single, double or triple wall plates as well as accommodate power, communications and A/V devices. Designed to maintain up to a 2 hour fire rating.

Acceptable part numbers for various sizes are as follows:
6 Gang:  EFBS6  
8 Gang:  EFBS8  
10 Gang:  EFBS10  
2 gang (furniture feed) EFBFF  
Cover style for floor boxes shall be brass, unless approved by NKU IT

Poke thru devices shall be Wiremold EVOLUTION series style provide the interface between power, communication and audio/ visual (A/V) cabling in an above grade concrete floor and the workstation or activation location where power communication and/or A/V device outlets are required. Provide recessed device outlets that will not obstruct the floor area. The poke-thru device shall be compatible with the complete line of workstation connectivity outlets and modular inserts. Permit all wiring to be completed at floor level.

The 6AT, and 6ATCFF units shall mount in a 6" [152mm] cored hole, actual 6 1/16" [154mm] core hole.

The 8AT units shall mount in an 8" [203mm] cored hole, actual 8 1/16" [205mm] core hole. Use is defined by the UL Fire Resistance Directory as a minimum spacing of “2 ft. [610mm] on center and not more than one device per each 65 sq. ft. [6m2] of floor area in each span.”

Cover plates for poke-thru devices shall be brass, unless approved by NKU IT

**Wall Boxes (A/V, Power, Data behind flat screens):**

Standard for all wall boxes is the Evolution series from Legrand/Wiremold.

Wall Boxes:
Should be used for TVs, Monitors, & Digital Signage for use in new construction and renovation construction projects. Should be compatible with complete line of workstation connectivity outlets and modular inserts, and most audio/video manufacturers’ products. Should provide the interface between power, communication and audio/video (A/V) cabling new construction and renovation location where power and communication and/or A/V device outlets are required. Should provide recessed device outlets that will not obstruct the wall area. Should permit all wiring to be completed at box level.

Other:

Underground duct application: Maxcell, 3 inch, 3 cell, inner duct. Maxcell PN: MXC3456XX5001 (last four characters vary based on needed length) or equivalent

Indoor application: FEP orange Eastern corrugated inner duct. Eastern PN: PDPU1000 (plenum rated as required by code).

Ortronics Tubular Runway 12”W Black. Ortronics PN: OR-TRT10-12B
Ortronics Cable Runway to rack mounting brackets. Ortronics PN: OR-MM6CRB16
Ortronics overhead cable pathway rack kit. Ortronics PN: OR-604010010
Ortronics overhead runway cable drop out. Ortronics PN: TRP11-CM
Ortronics Transition Pan for 12” runway. Ortronics PN: OR-TRP11-CM

Cable Tray (basket style) shall be Cablofil.
Open cable supports (J-Hooks) shall be Erico/Caddy

1.5. I.

**Summary:**

A separate spreadsheet summarizes the entire list of NKU approved materials. This is to be requested from NKU IT.

2.0 CABLE PLANT

2.1 TELECOMMUNICATIONS ROOM REQUIREMENTS

2.1. A.
Each MDF/IDF shall be a (stand-alone wiring room) located such that no single UTP (Unshielded Twisted Pair) horizontal cable run shall exceed 90 meters in total length including service loops. MCRs must be located on the lowest floor
of the building. Every floor must have an IDF or MDF to serve outlets on that same floor. All such rooms must be vertically stacked. Telecommunication Rooms shall not be co-located in custodial, mechanical or other shared space where damage to critical electronics may occur. Each room shall be sized according to use, and meet the below listed criteria. Coordinate with a representative of NKU’s Office of Information Technology prior to the installation of backboards, grounding systems, bonding systems, and electrical service.

Floor Size: MDF Rooms 12' x 15' minimum or ANSI/TIA/EIA 569 specification.
Floor Size: IDF Rooms 12' x 12' minimum or ANSI/TIA/EIA 569 specification.

Floor Surface: Treated / sealed concrete.

Floor loading: 50 lb. per ft. minimum or as required by applicable codes.

Riser sleeves/conduits between floors shall be a minimum of 6 inches and provide pulls strings.

Prefer no false / drop ceiling be installed. If drop ceiling must be installed, Ceiling Height: Minimum of 8.5 ft. clear height above finished floor.

Door Size: 3' wide and 6.7' tall w/180 swing out.

Wall Lining (backboard): AC-grade 3/4" x 4' x 8' sheets plywood, with no voids, covered on all sides, with two coats white fire retardant paint, cut outs to allow access to any wall boxes for communications or power.

Lighting: Minimum 500 lux measured at 3' above finished floor throughout the room.
Overhead fluorescent light fixtures must be installed at minimum nine (9) feet above finished floor or at least two (2) feet away from copper cable pathways, rack tops, and overhead cable runways.

Power: Provide dedicated, isolated, non-switched, 4-way, 120Vac 20Amp, circuits, installed every four (4) feet around room walls. On the bay of data racks provide two (2) each 220Vac, 20 AMP, twist lock, dedicated circuits on standard building electrical power. Also, provide two (2) each 220Vac, 20 AMP, twist lock, dedicated circuits on UPS power.

UPS Power: UPS power should be provided by a single UPS, located in the maintenance area, near the building electrical switching gear and backup generator. UPS power is to be provided for all network equipment in the MDF/IDF’s.

Overhead runway: Provide overhead cable runway to ring the room and, at minimum, cross the room over data racks. Drop out devices (water falls) shall be installed at locations where cables drop down out of runway or horizontal conduit or sleeves.

Grounding and Bonding: Install a contiguous Intra-building grounding and bonding system in compliance with NEC Article 250 and TIA/EIA-607 using a minimum conductor size of 6 AWG to be located on each plywood backboard with Ground Bus Bar as directed.

Service slack: All MDF / IDF closet cables must have industry standard amount of service slack, at each end, within the wiring room. Service loop shall run entire perimeter of IDF / MDF in 18” ladder tray.
Security: Unique telecom key compatible University standard for data closets.

Location: Room shall be located such that no single horizontal workstation cable shall exceed 90 meters in total length including service loops.

HVAC and Humidity: Separate HVAC units need to be designed and strategically placed to serve all data/communications rooms with year-round temperature and humidity control and maintain a constant temperature of 64 - 75 F with one air change per hour.

Fire Protection: As required by applicable codes.

2 post Equipment Rack: 7’ x 19” x 30” cable management rack (see 1.5.D) with wire management (see 1.5.H) shall be provided and installed as directed. All other specifications of ANSI/TIA/EIA 569 apply.

Other Network devices: All equipment housed in the MDF/IDF will be required to have separate data outlets installed to the patch panel and labeled. No equipment will be permitted to plug directly into a network switch.

Network Equipment Installation: No network equipment is to be installed before the MDF/IDF rooms are inspected for electrical power and UPS, HVAC, security (NKU locks installed) and free of dust and debris.

2.1. B.
No copper communication cabling shall be run adjacent and parallel to power cabling. A minimum of 18” distance is required from any fluorescent lighting fixture or 6” from power lines up to 2kVA and 24” from any power line over 5kVA. Similarly, cable should be routed and terminated as far as possible from sources of EMI or RFI, such as ballasts, generators, fans, motor control units, motors, etc.

2.1. C.
The MDF/IDF shall be constructed using 110 wiring distribution systems for voice. Use patch panels, equipment racks and distribution systems for fiber optics as specified in the materials list. Cable terminations, order of terminations, groupings, numbering plans and labeling shall be performed in accordance with NKU’s Office of Information Technology conventions (per paragraph P.1.4.b.). See sections pertaining to Horizontal and Vertical Cable. Coordinate with a representative of the NKU Office of Information Technology prior to installation of MDF/IDF distribution and termination hardware.

2.2 ENTRANCE FACILITIES

2.2. A
Outside plant facility requirements shall be coordinated with the NKU Office of Information Technology. A minimum of (4) 4” inside diameter schedule 40 PVC conduits shall be run from the MDF to the designated vault or tunnel system. Conduits shall be buried a minimum of 24” from the surface on a foundation of 10” wet sand fill. A metallic locator ribbon shall be installed above and parallel to the conduits. There shall be a minimum horizontal separation of 24” from co-located buried electrical service. One pull string shall be installed in every conduit.

2.2. B.
Outside copper cable pair count shall be a minimum of 100 pair. (Building specific, to be determined in conjunction with building occupancy and purpose)
Use only 24AWG, PE-89 Type REA, direct bury cable with foam skin/filled core, 8-mil aluminum shield, polyethylene jacket, where applicable. See material list. Copper cable shall be terminated in a minimum of (100) pair increments in its entirety for the count of the specific cable at the MDF in a Building Entrance Termination (BET) system.

2.2. C. The other end of the copper cable shall be terminated in a minimum of (100) pair increments in its entirety at the MDF of its origin as determined by the NKU Office of Information Technology. See materials list.

2.2. D. Copper inter and intra connection cable facilities shall be tested and documented at 100ohm with maximum 0% failure allowed.

2.2. E. Outside fiber optic cable strand count shall be determined by the NKU Office of Information Technology. Fiber optic cables shall be terminated in their entirety at the MDF in a Fiber Patch Cabinet. Fiber terminations that connect separate buildings shall be in their own Fiber Patch Cabinet. Fiber terminations that don’t leave a building shall be in their own Fiber Patch Cabinet and not in the Fiber Patch Cabinet for the separate buildings. See materials list in 1.5.F. Cable shall utilize Corning glass. See materials list. Fiber optic fan-out and terminations shall be performed using fan out kits with LC style connectors.

2.2. F. Fiber optic cable shall be terminated in its entirety at the TR/ICR/MCR of both its origin and final destination in a Fiber Patch Cabinet. See materials list. Fiber optic fan-out and terminations shall be done using LC or SC style connectors.

2.2. G. Single Mode Fiber optic facilities shall be OTDR and bi-directional insertion loss tested and documented at 1310nm/1550nm with maximum 0% failure allowed. Max cable attenuation is .4/.3 for loose tube and .7/.7 for tight buffer.

Test results for single fiber shall not exceed maximum attenuation allowed based on EIA/TIA loss calculation formulas. Test results must be provided to NKU in .pdf format.

2.2. H. Grounding and Bonding shall conform to NEC Article 250 and ANSI/TIA/EIA-607 using a minimum conductor size of 6 AWG. See material list.

2.3 HORIZONTAL WORKSTATION CABLES AND POWER REQUIREMENTS PER LOCATION

2.3. A If IP phones are in use, covert Voice outlet for a Data outlet in all spaces.

Single Occupant Office
- Minimum 2, Duplex (Data & Voice) Outlets (1 each on opposing walls)
- Duplex Power Outlet adjacent to each Data & Voice Outlet.
Cubicle Space
Minimum 2, Duplex (Data & Voice) Outlets
Duplex Power Outlet adjacent to each Data & Voice Outlet.

Shared Offices
Minimum 1, Duplex (Data & Voice) Outlet per Occupant
1 Duplex (Data & Voice) Outlet for Shared Printer and
Duplex Power Outlet adjacent to each Data & Voice Outlet.

Reception/Support Areas
Minimum 1, Duplex (Data & Voice) Outlet per Occupant
Minimum 1, Duplex (Data & Voice) Outlet for Shared Printer
And Duplex Power Outlet adjacent to each Data & Voice Outlet.

Copy Room/Storage Rooms
Minimum 2, (Data & Voice) Duplex Outlets and
Duplex Power Outlet adjacent to each Data & Voice Outlet.

Lounge Space, Café, Study Areas
Layout and quantity depends on design.
Data Duplex Outlets for Laptop Access and
Duplex Power Outlet adjacent to each Data Outlet.

Non-Classroom Instructional Spaces/ Seminar Rooms/ Conference Rooms
Minimum 4 Data & 2 Voice Faceplates (opposing walls) and
Duplex Power Outlet adjacent to each Data & Voice Outlet
Preferred: Level 2 Smart Classroom Technology (scaled to room size and
use). See below.

Classrooms and Labs
Minimum 6 Data at instructor station and 2 data at the ceiling mounted
projector.
Duplex Power Outlet adjacent to each Data and/or Voice Outlet.
Preferred: Level 2 Smart Classroom Technology. See below.

Computer Labs
Minimum 6 Outlets. Three (3) Data & one (1) Voice at instructor station
(1 at the ceiling mounted projector and 1 voice location to be determined
by NKU).
Duplex Power Outlet adjacent to each (Data & Voice) Outlet.
Level 2 Smart Classroom Technology, See below
Remainder of layout depends on design.

Level 2 Smart Classroom
Minimum 4 data outlets to be located at the podium location
2 Projector outlets to be located in the ceiling
Regular room layout depending on the room classification and
Duplex Power Outlet adjacent to each Data & Voice Outlet.

Vending Areas
1 Data outlet per vending machine
2 data outlets (minimum) per vending area

Multimedia Outlets (Fiber to the Desktop) Location TBD by NKU
4 Data & 2 Voice outlets per location
2 Fiber outlets
2.3. B.
Provide (1) Category 6 Augmented 4-Pair UTP cable for every voice outlet and (1) Category 6 Augmented 4-Pair UTP cable for every data outlet as specified in materials list. Cables shall be distributed in a horizontal star topology to the MDF/IDF. Total length of cable from workstation information outlet jack to the MDF/IDF shall not exceed 90 meters total length including service loops. This length includes a 12” service loop at the outlet and a full perimeter service loop in the telecommunications room. Each horizontal cable shall be installed in a "home-run" configuration. No "daisy chained" conduit or cables shall be allowed. All workstation cables are to be terminated using the T568A wiring standard.

2.3. C.
All cables shall be installed in conduit, cable tray, or "J" hooks. Minimum size of conduit should be no less than a 1” conduit. Fill ratios not to exceed the ANSI/TIA/EIA 569 specification. Where cables are not installed in conduit or cable tray, the cable shall not be pulled or installed directly across suspended ceiling tiles or fluorescent lights without proper suspension and consideration of possible electrical interference. If "J" hooks are used, avoid placing any pressure or creating stress points on the cable. Maximum spacing between "J" hooks shall not exceed five feet.

2.3. D.
At no time shall pulling tension exceed 25 lbs. on horizontal cables. Exceeding the maximum recommended pulling tension during installation of cables will compromise the wire integrity. If wire integrity is compromised, the wire may not pass testing and certification standards required for a 10-gigabit infrastructure. The installing contractor will be responsible for replacement of any cable system that does not pass required certification standards. A representative from the NKU Office of Information Technology may randomly test cable installations during weekly coordination meetings.

2.3. E.
Traditional nylon synch style Tie Wraps shall not be used to bundle cables in a MDF/IDF. Only Velcro Tie Wraps are acceptable to bundle cables within these rooms. See material list. Traditional nylon synch style tie wraps are acceptable in all other areas. The tie wraps must be installed as directed in the ANSI/TIA/EIA 568 specification.

2.3. F.
No Intra-building telecommunications cable shall be run adjacent and parallel to power cabling. A minimum of 6" distance is required from any fluorescent lighting fixture or power line up to 2kVA and 24" from any power line over 5kVA. Similarly, cable should be routed and terminated as far as possible from sources of EMF, such as ballasts, generators, fans, motor control units, motors, etc.

2.3. G.
Horizontal UTP station cable shall be terminated at the MDF/IDF in a manner such that each workstation location will be numbered and terminated in sequential order (see 1.4.b.) Data (Blue) cable shall be terminated in patch panels as specified in materials list and shall be located in 19" stand alone rack as specified in materials list. Horizontal and vertical fiber optic cable shall be terminated at MDF/IDF in fiber optic distribution cabinets as specified in materials list. Coordinate with a representative of the NKU Office
of Information Technology prior to installation of MDF/IDF distribution and termination cable hardware.

2.3. H.
Each workstation information outlet location shall use hardware as specified in materials list. The Category 6 Augmented cable shall be terminated T568A in a Blue Category 6 Augmented RJ45 jack. Stripping of cable jacket, untwisting of conductor pairs and termination shall be done using ANSI/TIA/EIA conventions. 12" of excess, jacketed, cable shall be coiled in ceiling above the drop location or as near as possible to accommodate future re-termination. Maintain UTP cable pair twists up to the point of termination (maximum of up to 1/4'' jacket removal allowed) at both the station/outlet end as well as patch panel/block end for each horizontal cable. Take caution as to refrain from physically changing or damaging the shape or geometry of the cable during installation, i.e., do not cinch cable ties too tightly; no kinks are allowed and avoid bends of cable. Do not place bundles in such a way that the weight of large bundles is damaging the cables on the bottom of the bundle. Each workstation information outlet jack wall plate shall be numbered sequentially, consistent with the MDF/IDF numbering layout plan. See section 1.4.B for description of cable labeling requirements.

2.3. I
Cables shall be dressed in to patch panels directly from vertical wire managers.

2.3. J.
Contractor shall test and certify, in writing, building wiring meets or exceeds all applicable ANSI/TIA/EIA 568, 569, 607, 758 or others as applicable conventions and standards for Cat6a. Contractor shall test and certify, in writing, building wiring shall support 10 Gigabit Ethernet technologies. Contractor shall warrant Communication cabling system wiring for a period of not less than 25 years, upon acceptance.

2.4 VERTICAL RISER CABLE

2.4. A.
A minimum of (4) 4" conduit paths shall be provided between the MDF/IDF’s & BIDF.

2.4. B.
For each (12) workstation locations there shall be a (25) pair copper riser from the MDF/IDF to the MDF/IDF as applicable. Copper riser cable shall be of a 25 Pair Category 3 riser rated FEP construction as specified in materials list. All riser cable shall be terminated using 110 IDC wiring distribution systems as specified in materials list. Riser cable shall be terminated on a separate 100 pair block from horizontal station cable. Labeling of all riser and workstations cables shall be labeled in accordance with the NKU Technology Infrastructure labeling documentation. Coordinate with a representative of the NKU Office of Information Technology prior to installation and termination of riser cable and hardware.

2.4. C.
Each MDF/IDF shall have a 12 or 24 strand count single mode Fiber optic cable
Indoor only fiber optic installations will utilize plenum-rated armored single mode 12 strand premise distribution cable.

Outdoor or indoor/outdoor fiber optic installations will utilize plenum-rated single mode 12 strand armored indoor/outdoor plenum-rated cable.

See materials list. Coordinate with a representative of the NKU Office of Information technology prior to installation of fiber optic riser cable.

2.5 PATHWAY SUPPORT SYSTEM

2.5. A. All horizontal cable shall be installed using a home-run configuration. Conduit and cable tray are acceptable in any combination to support the cable system and not violate Cat6a rules.

2.5. B. Conduits shall be dedicated, using no smaller than a 1 1/2" inside diameter per workstation outlet. There shall be no daisy-chain conduit runs. Each workstation location shall require one 1 1/2" conduit, which is a home run back to the appropriate MDF/IDF or cable tray. Provide pull boxes in communications conduit runs spaced not greater than 100 feet apart, and also provide a pull box located at half the distance of the length on any conduit with more than two right angle bends. If more than two bends are in any 100-foot section, increase the conduit by one trade size. See ANSI/TIA/EIA-569-A Section 4.4 Place TELECOMMUNICATIONS label on all pull and junction boxes. If a cable tray system is installed, the conduit shall be a home run from the workstation outlet jack to the tray. Conduit runs shall comply with cable fill capacity and bend design as specified in ANSI/TIA/EIA-569-A documents.

2.5. C. Traditional nylon synch style Tie Wraps shall not be used in MDF/IDF’s to bundle cables. Velcro style Tie Wraps are the only acceptable method to secure cable bundles in TR/ICR/MCR’s. See materials list. At no time shall pulling tension exceed 25 lbs. on horizontal cables. Exceeding the maximum recommended pulling tension on Category 6 Augmented cables will compromise cable integrity. If wire integrity is compromised, the wire may not pass testing and certification standards required for a 1000BaseTX infrastructure. The installing contractor will be responsible for replacement of any cable system that does not meet required standards.

2.5. D. No intra/inter-building telecommunications cable shall be run adjacent and parallel to power cabling. A minimum of 6" distance is required from any fluorescent lighting fixture or power line up to 2kVA and 24" from any power line over 5kVA. Similarly, cable should be routed and terminated as far as possible from sources of EMF, such as generators, motors etc.

3.0 Warranty

3.1. A. All work is to be covered by minimum of a twenty-five year warranty supplied by Ortronics and General Cable Corp.

3.2. B Ortronics/General Cable Corp Structured Cabling System Warranty
QUALIFICATIONS AND REQUIREMENTS

To qualify for the 25 year Warranty, all of the following conditions must be met:

1. Products used in the network cabling system for which warranty support is requested must be qualifying Supplier products. System components must be new (never used before).

2. The network cabling infrastructure must be designed in accordance with TIA-568 and other relevant premises series standards in effect at the start of the time of purchase.

3. The network cabling infrastructure must be installed by Supplier approved designers and Certified Contractors at the Certified Installer Plus tier in accordance with manufacturer’s installation instructions and specifications. Supplier is not liable for third party design errors or improper construction.

4. Each permanent link or channel in the network must be field tested in accordance with the TIA-568 series industry standard testing requirements in force at the time of purchase. The installed permanent links and channels must have passed all applicable TIA performance requirements. Minimum testing for copper systems includes Wire Map, Length, Attenuation, Near End Crosstalk, Far End Crosstalk, Return Loss, PS NEXT, ELFEXT, and PS ELFEXT. Minimum testing for Fiber Optic links includes horizontal and backbone, Bi-Directional Dual Wavelength, Insertion Loss and Length.

5. Special consideration for Category 6A+ Solutions: Designed specifically to mitigate the effects of Alien Crosstalk (ANEXT) between cable segments, Alien Crosstalk field testing is not required for certification of Category 6A+ systems. Alien Crosstalk testing requirements are only waived if the installed system is comprised entirely of approved Category 6A+ cabling and components including horizontal cabling, patch cords, equipment cords, and associated connectivity. This exception is exclusive to Category 6A+ Alien Crosstalk testing parameters. All Category 6A testing requirements must be performed to certify the installation.

6. Appropriate Warranty Applications should be properly completed online through the Ortronics ConCert certified contractor website prior to initiating the installation.

7. The Warranty Submittal must be completed online within 10 days of installation completion. Copies of all certification test reports must be submitted as part of the Warranty Submittal, and be kept on file by the registrant to be re-submitted when requested by Supplier. Data must be saved and submitted in raw data and summary formats. Test data must be submitted via online upload to the Ortronics ConCert Certified Contractor website. E-mail or disc may be used if the online upload is unsuccessful (please contact the Warranty Administrator for detailed instructions).

8. The 25 year Warranty will be void if (1) the system is not maintained in accordance with industry standards (2) a third party has changed, modified or attempted maintenance or repair on otherwise qualifying Supplier products, or (3) changes are made after warranty issuance and acceptance date, unless Supplier grants written consent for such changes.
and installation records are updated and forwarded to the Supplier reflecting these approved changes. All changes must be submitted for approval following the original warranty application process.

9. Supplier has issued a registered warranty certificate to Buyer for the Warranty. Buyer may not sell, assign or transfer the Warranty.

ADMINISTRATION

Warranty applications will be approved or disapproved by Supplier with a response sent to the applicant. Access to the Warranty application information can be obtained by contacting the Warranty Administrator at +1-860-405-2988, or by e-mailing your request to contractor.cert@legrand.us. All warranty applications must be completed on Certified Contractor website.

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